U.S. SPACE INDUSTRY 'DEEP DIVE'

A COLLABORATION BETWEEN THE DOC AND THE USAF, NASA, AND NRO

SECOND WAYPOINT PRELIMINARY FINDINGS

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

U.S. Space Industry 'Deep Dive' Assessment - Background

- Partnership with the U.S. Air Force, National Aeronautics and Space Administration, and the National Reconnaissance Office.
- The principle goal is to gain an understanding of the intricate supply chain network supporting the development, production, and sustainment of products and services across the defense, intelligence, civil, and commercial space sectors.
- Objectives:

a) Map the space industrial base supply chain in unprecedented detail;

b) Identify interdependencies between respondents, suppliers, customers, and USG agencies;

c) Benchmark trends in business practices, competitiveness issues, financial health, etc. across many tiers of the industrial base; and

d) Share data with USG stakeholders to better inform strategic planning, targeted outreach, and collaborative problem resolution.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

U.S. Space Industry 'Deep Dive' Assessment - Background (cont.)

- All partners worked together to develop a survey that minimized industry's burden and meet the objectives of all stakeholders.
  - Open and cooperative collaboration between partners was critical to making this assessment as success.
  - All partners will receive the survey data – they know best how to use this information to support their respective missions.

- In June 2012, the 'Deep Dive' survey was distributed to approximately 9,150 organizations, including companies, universities, non-profits, and USG agencies.

- The collection is divided into three, three-month long waypoints. We have reached the second waypoint.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Overview of Second Waypoint Data

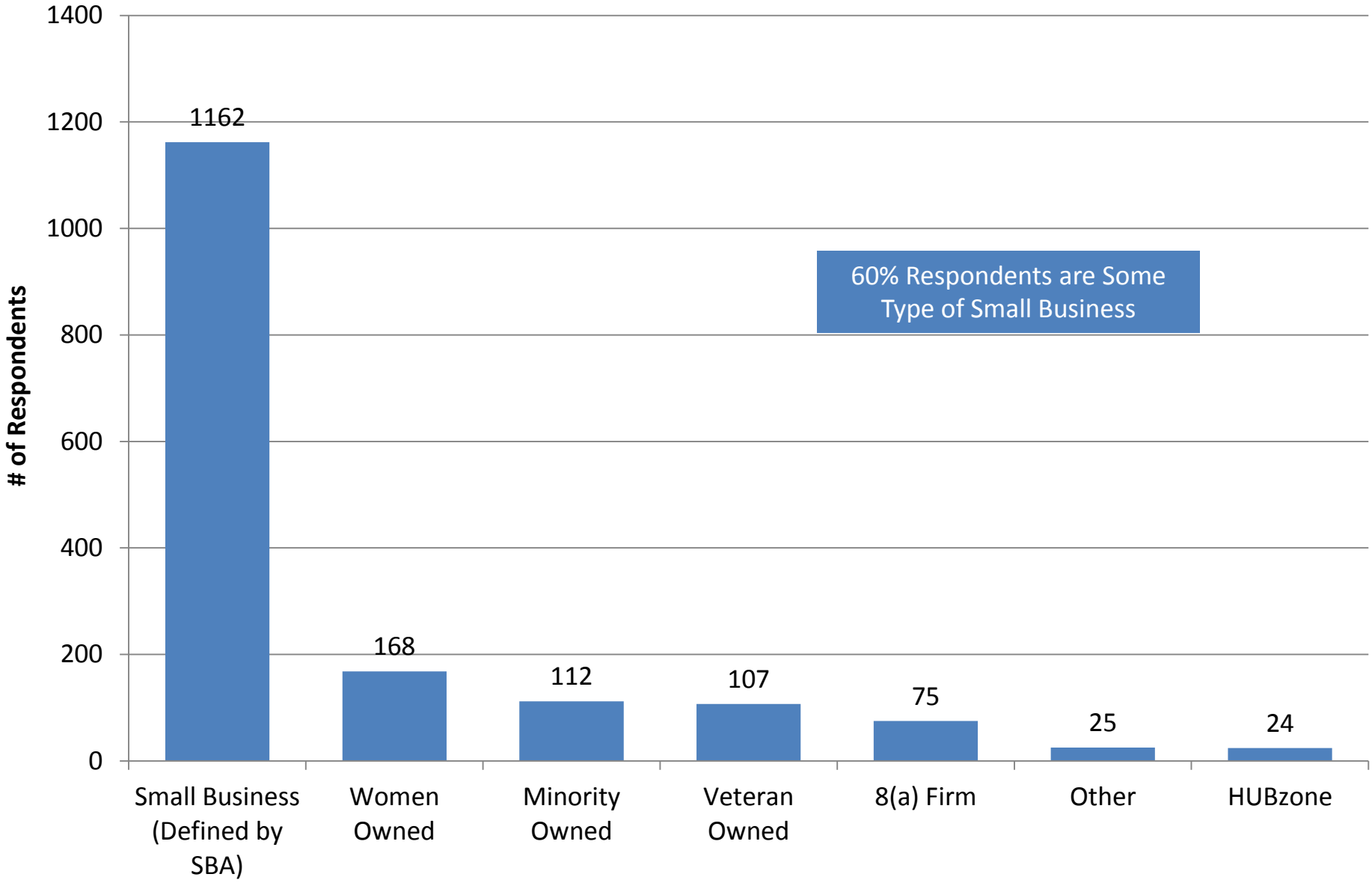
Respondents by Type of Organization	
Commercial Companies	1,892
Universities	83
Non-Profit Organizations	30
U.S. Government Agencies	17
Total	**2,022**

60% Respondents are small businesses, as defined by the Small Business Administration

Second Waypoint Respondents by Average Annual Net Sales (2009-2012)	
Very Small (Less than $10M)	899
Small ($10 – 50M)	508
Medium ($50 – 250M)	289
Large ($250M – 1B)	120
Very Large (Greater than $1B)	89
No Sales	117

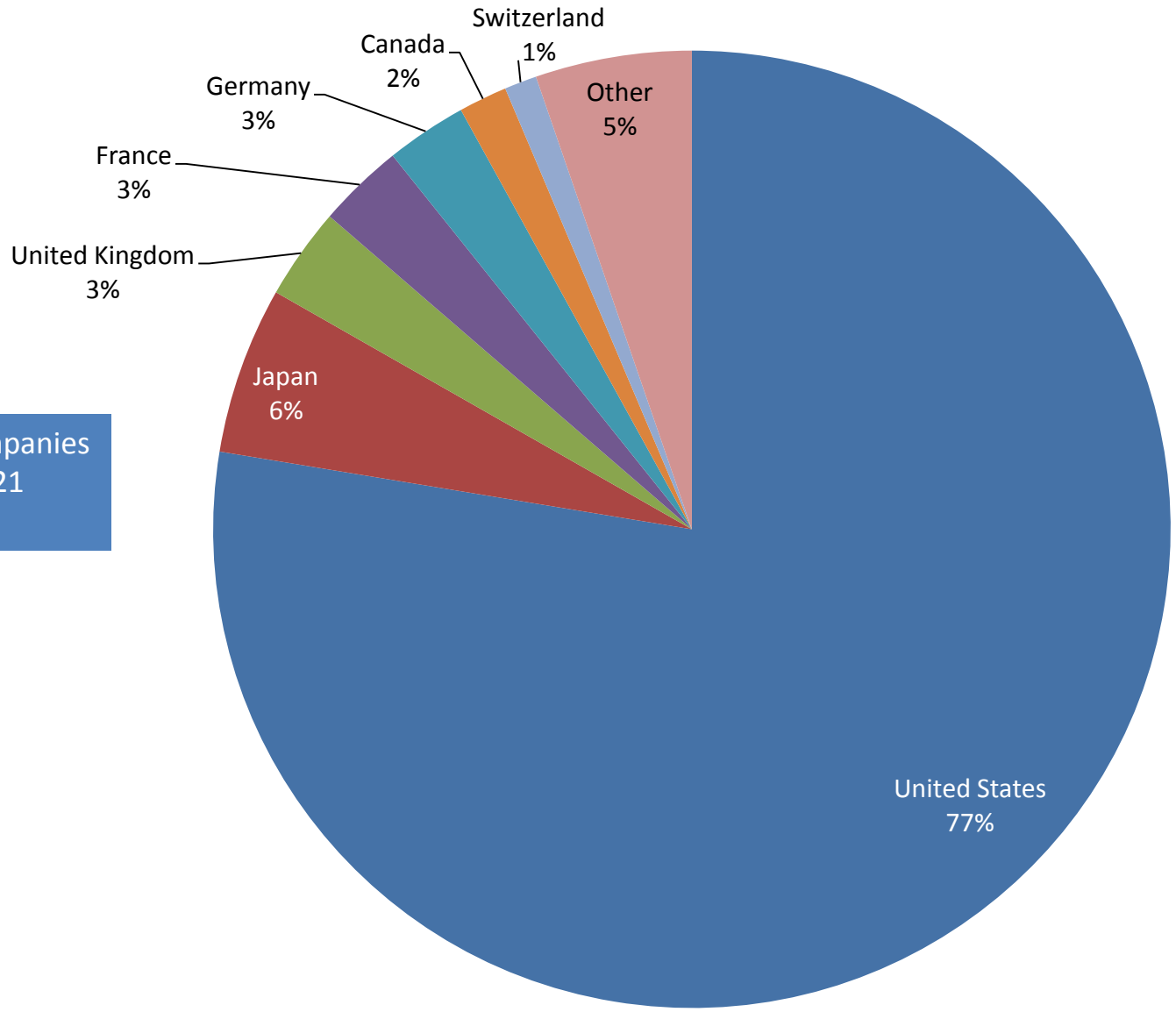
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Self-Identified Small Businesses by Type



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

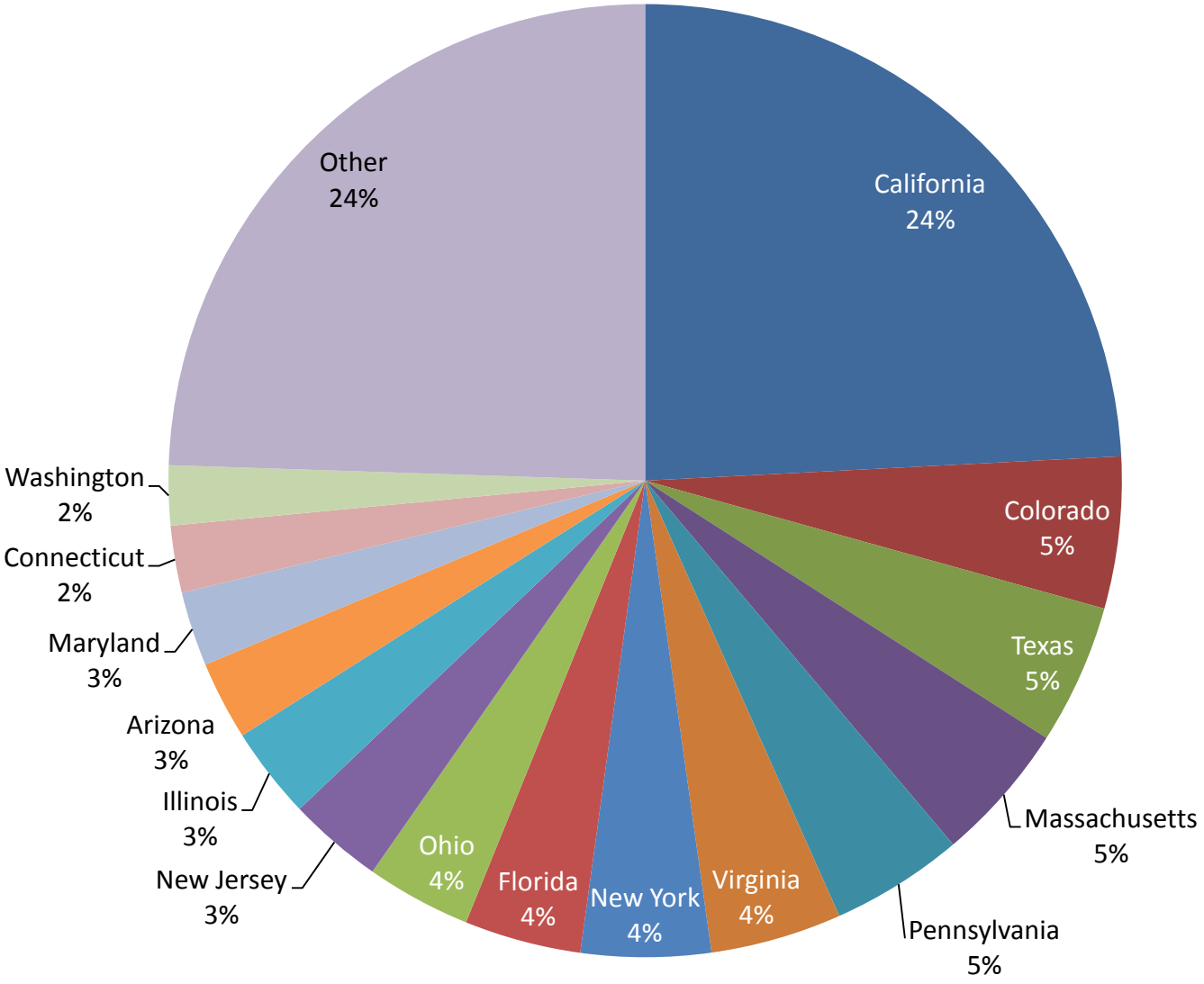
Location of Respondent Parent Companies



Parent Companies Located in 21 Countries

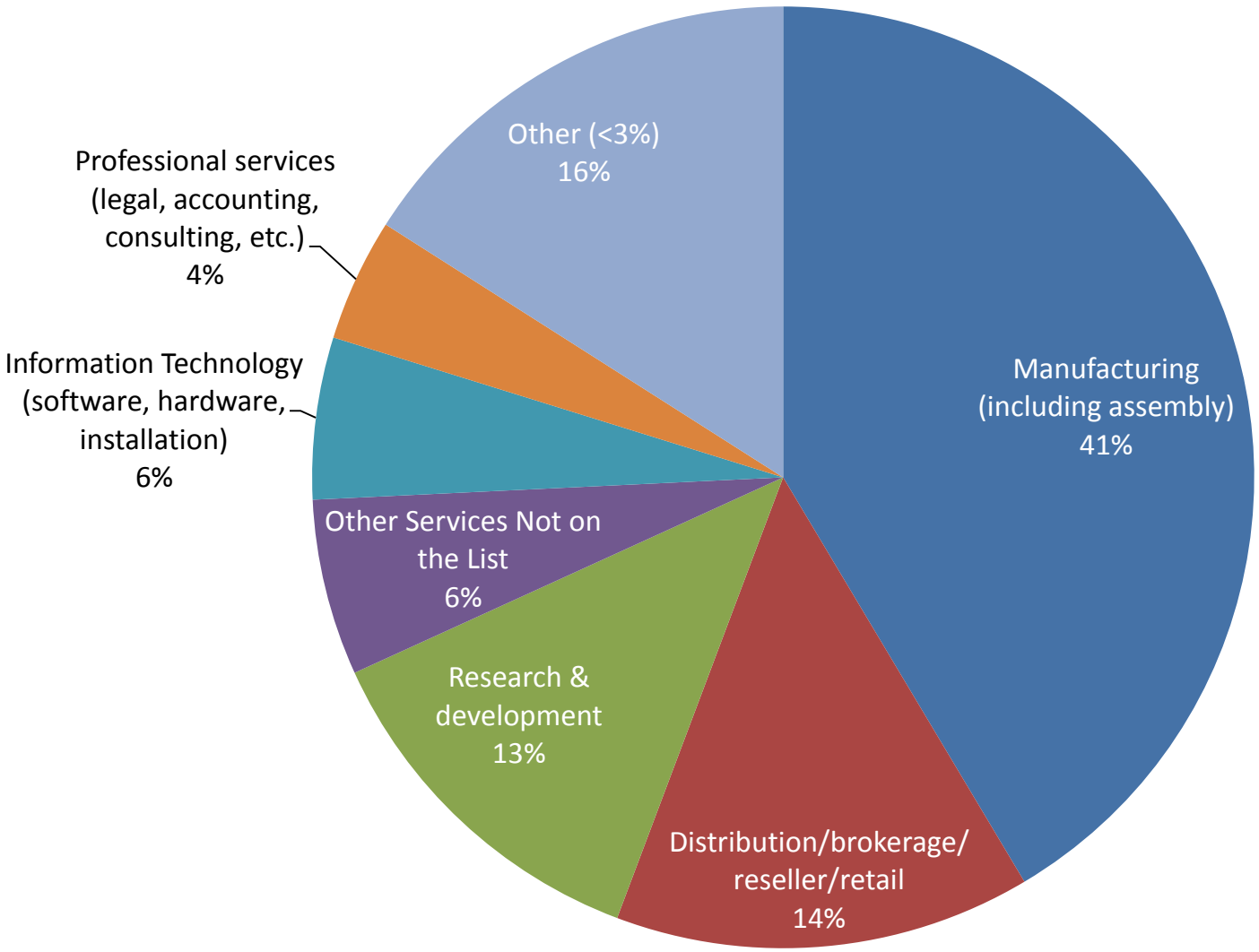
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

U.S.-Based Respondents by State



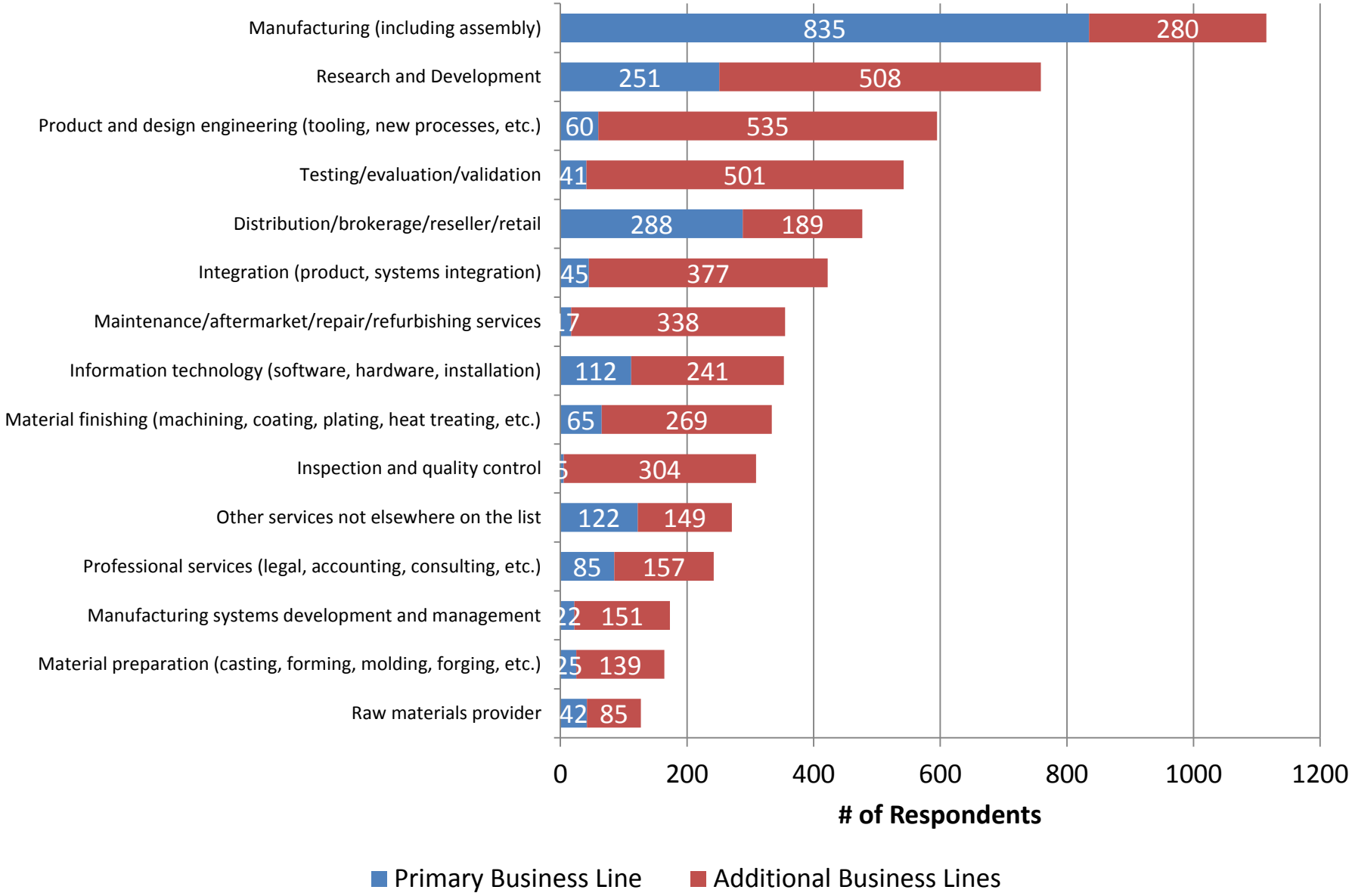
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Respondents' Primary Business Line



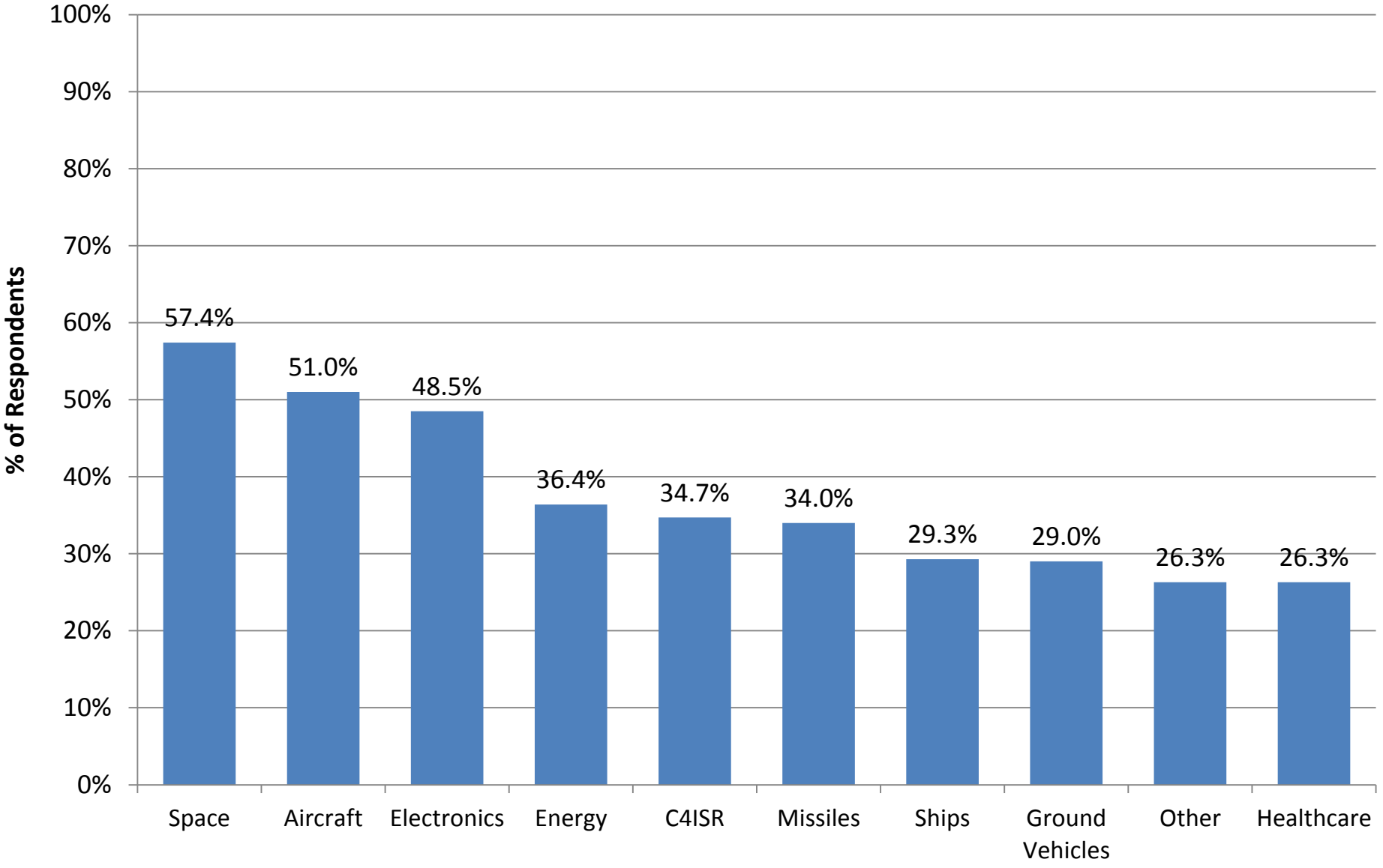
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Respondents' Primary and Additional Business Lines



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Percent of Respondents Serving Selected Market Segments



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

The Product and Service List

- The Product and Service List is comprised of 360 individual products and services, grouped into 16 general segments.

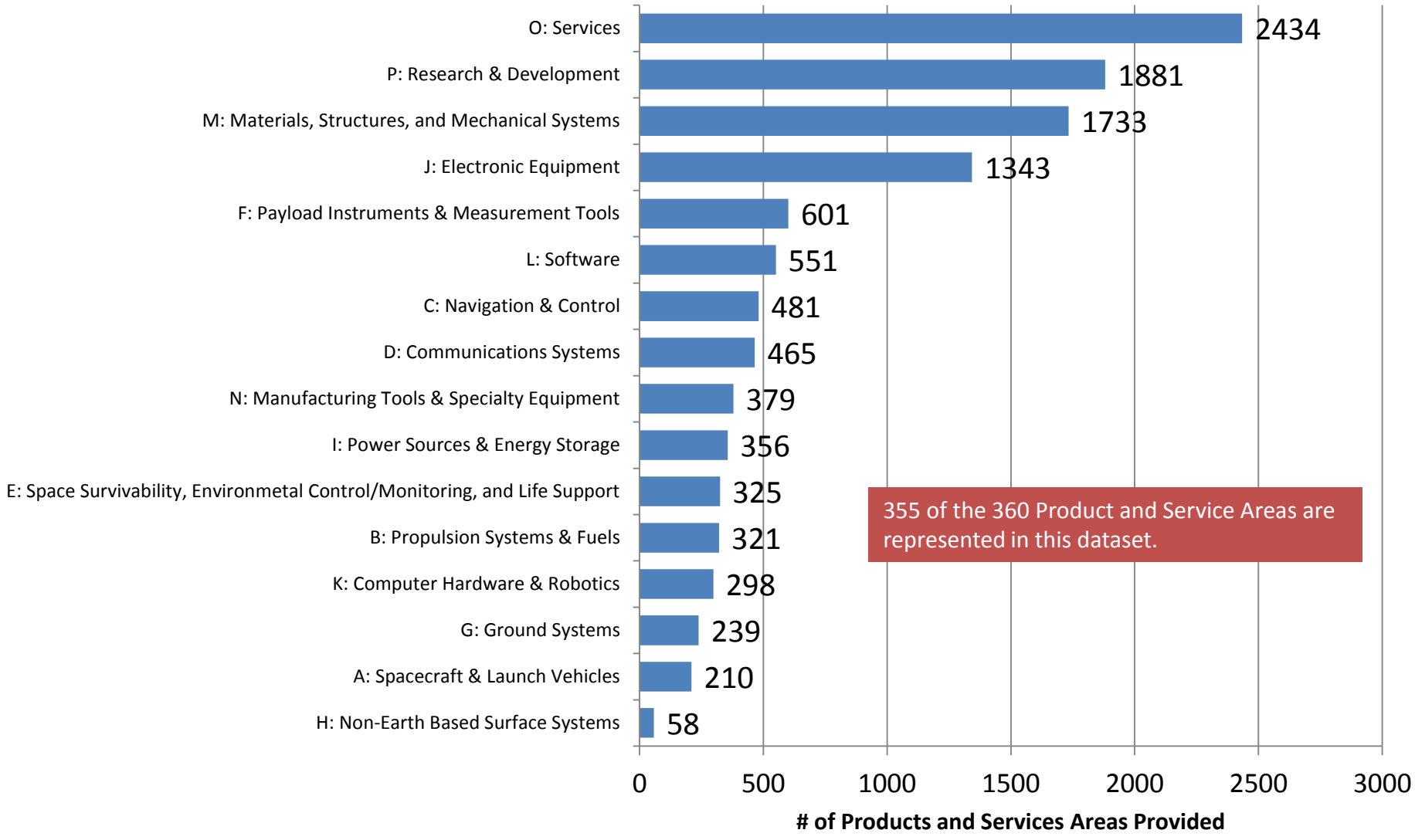
- The list is designed to capture how respondents fit into the space industrial base.

- Product and Service Segments:

A. Spacecraft & Launch Vehicles
B. Propulsion Systems & Fuels
C. Navigation & Control
D. Communications Systems
E. Space Survivability, Environmental Control/Monitoring, and Life Support
F. Payload Instruments & Measurement Tools
G. Ground Systems
H. Non-Earth Based Surface Systems
I. Power Sources & Energy Storage
J. Electronic Equipment
K. Computer Hardware & Robotics
L. Software
M. Materials, Structures, and Mechanical Systems
N. Manufacturing Tools & Specialty Equipment
O. Services
P. Research & Development

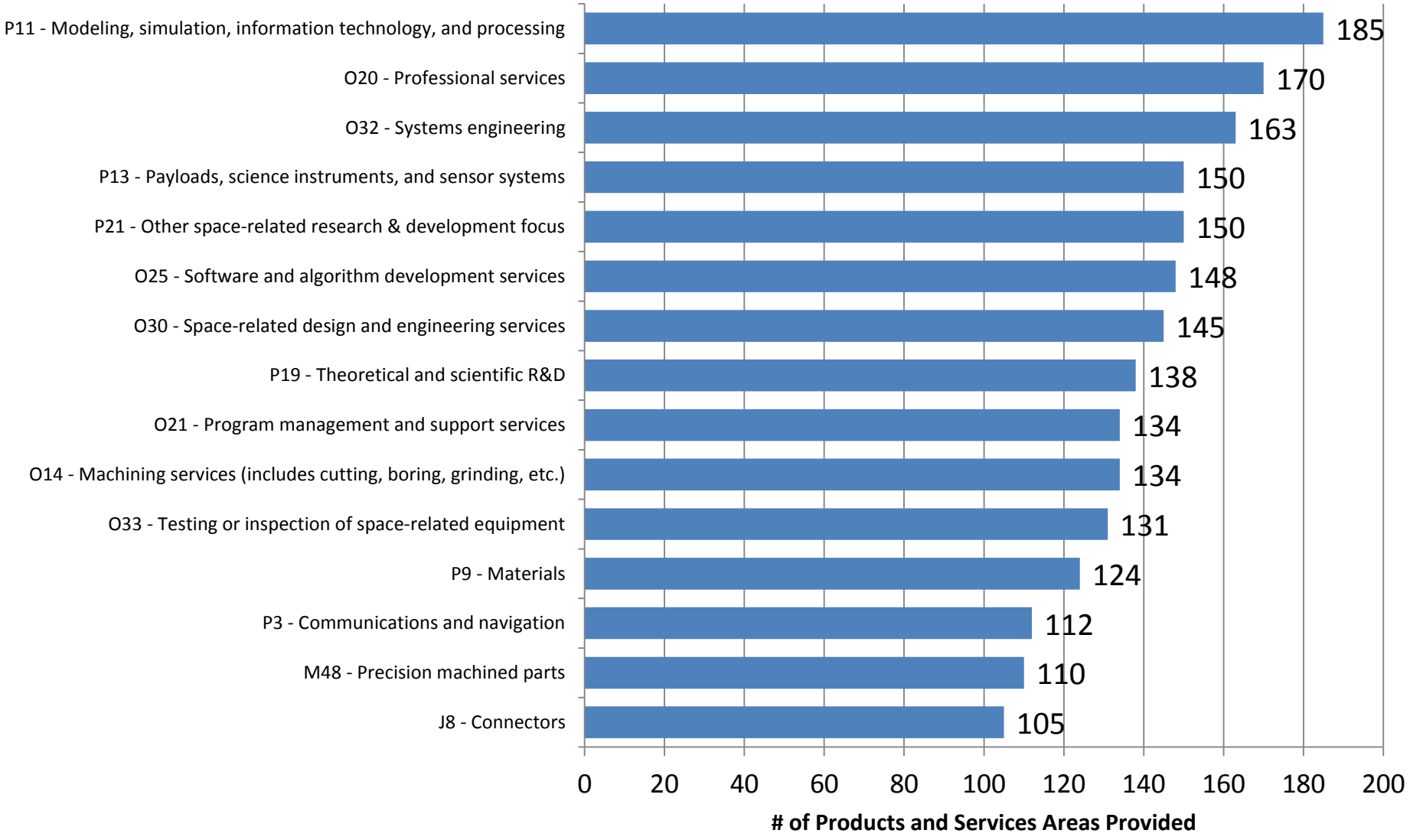
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Products and Services Provided by Segment



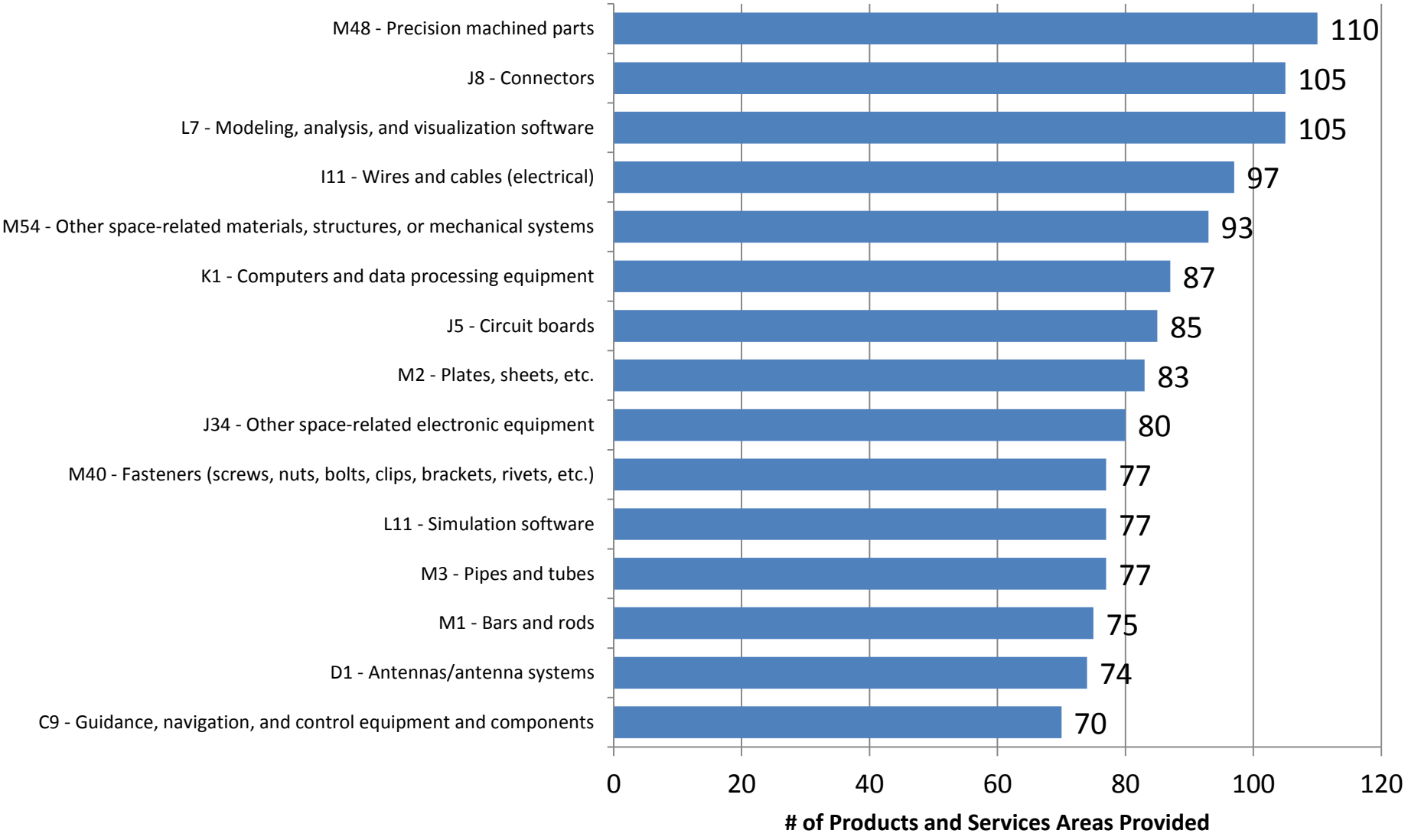
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 Product/Service Areas Provided by Respondents – All Segments



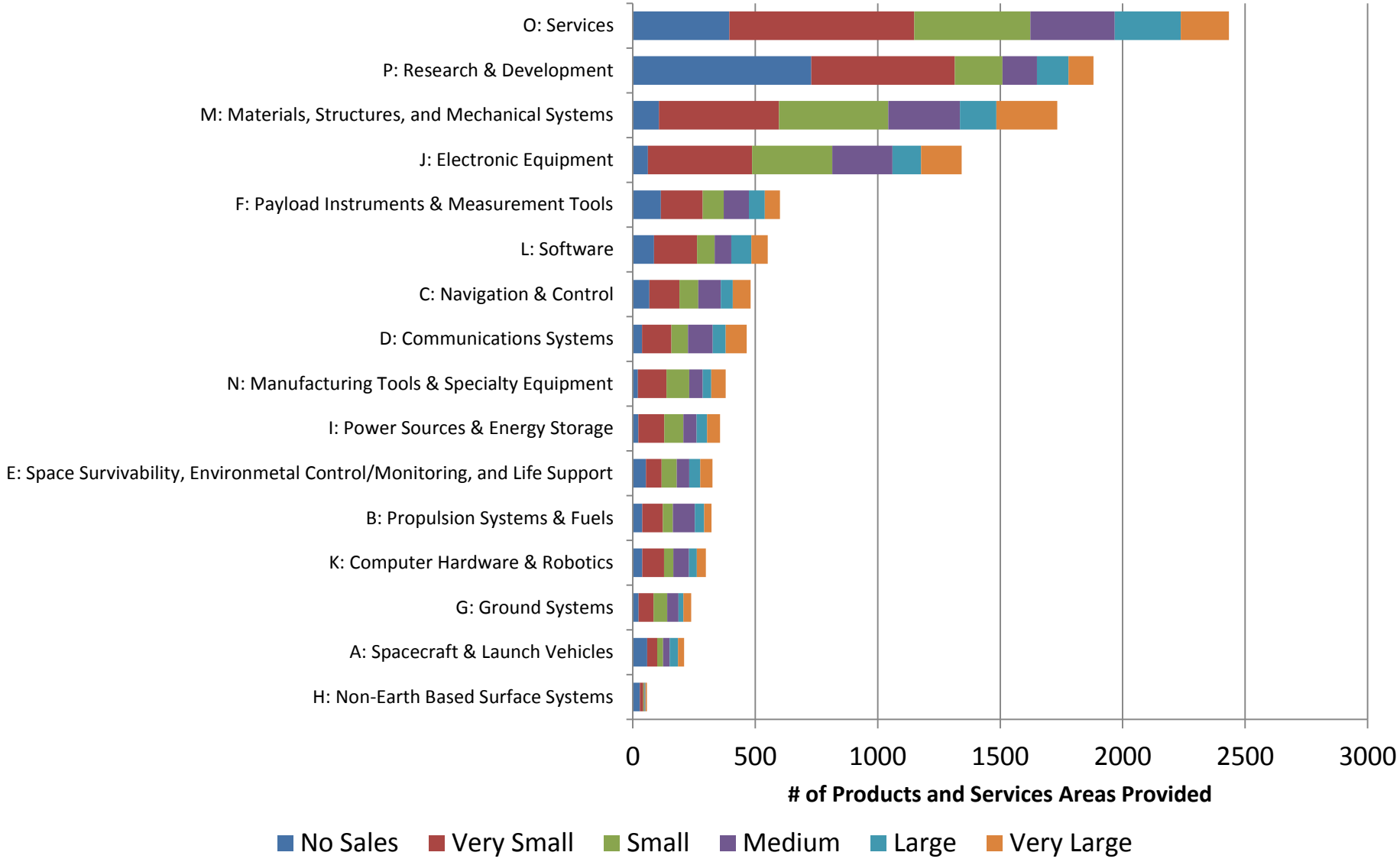
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 Product/Service Areas Provided by Respondents – Excluding Services and R&D



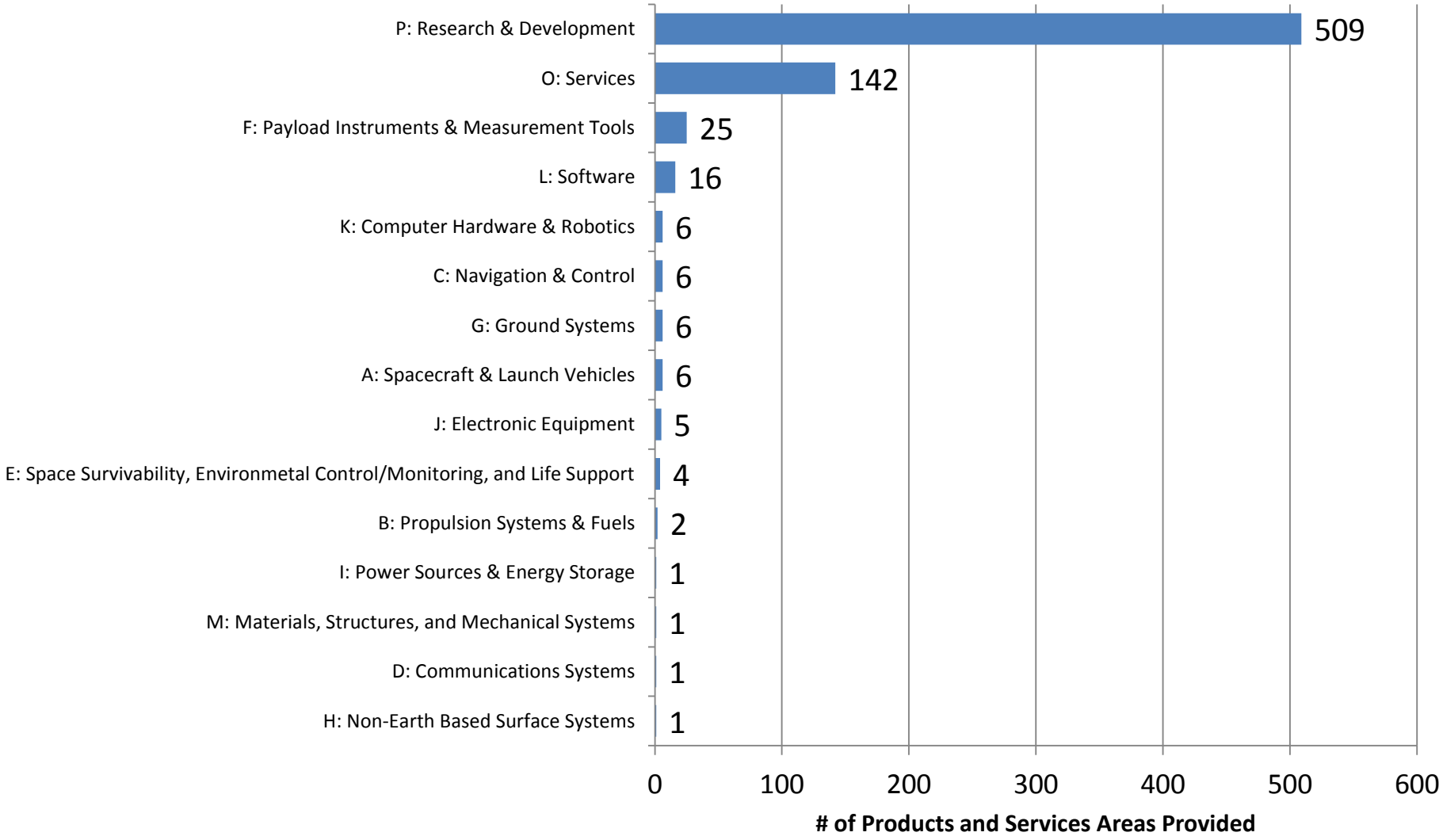
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Products and Services Provided by Commercial Organizations - By Organization Size



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

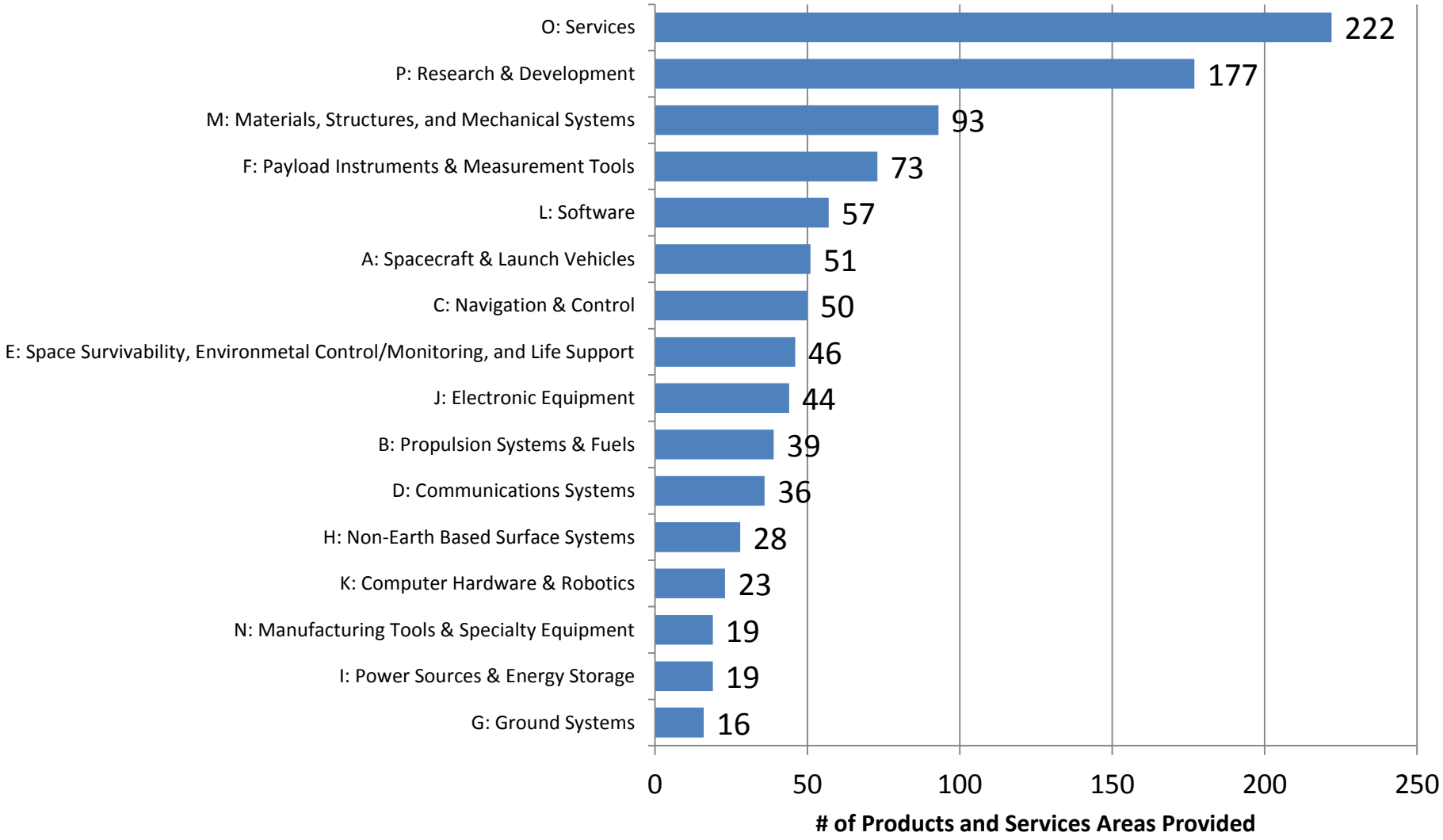
Products and Services Provided by Universities*



* Based on 83 responses from universities.

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

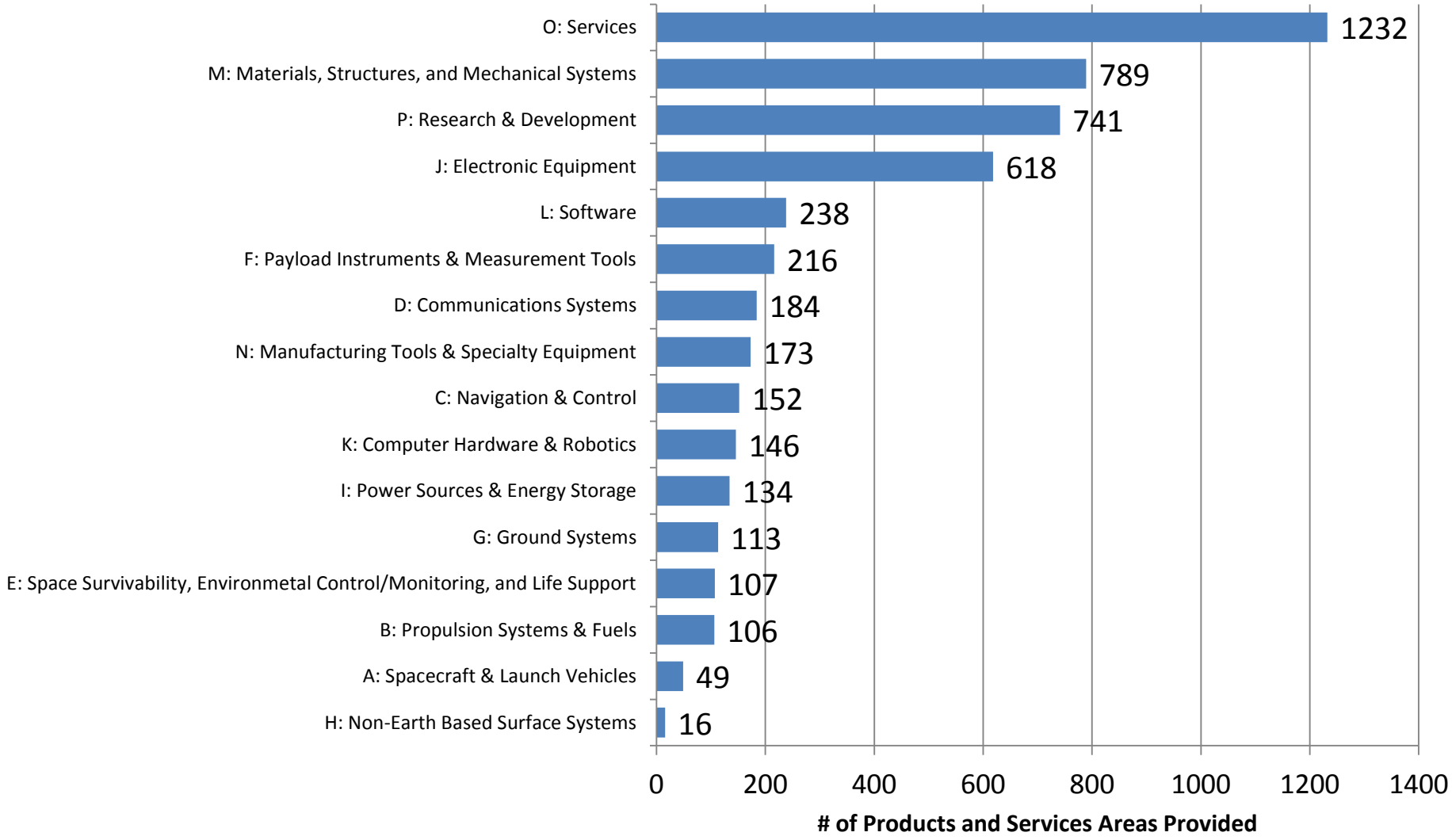
Products and Services Provided by U.S. Government Organizations*



* Based on 17 responses from U.S. Government organizations.

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

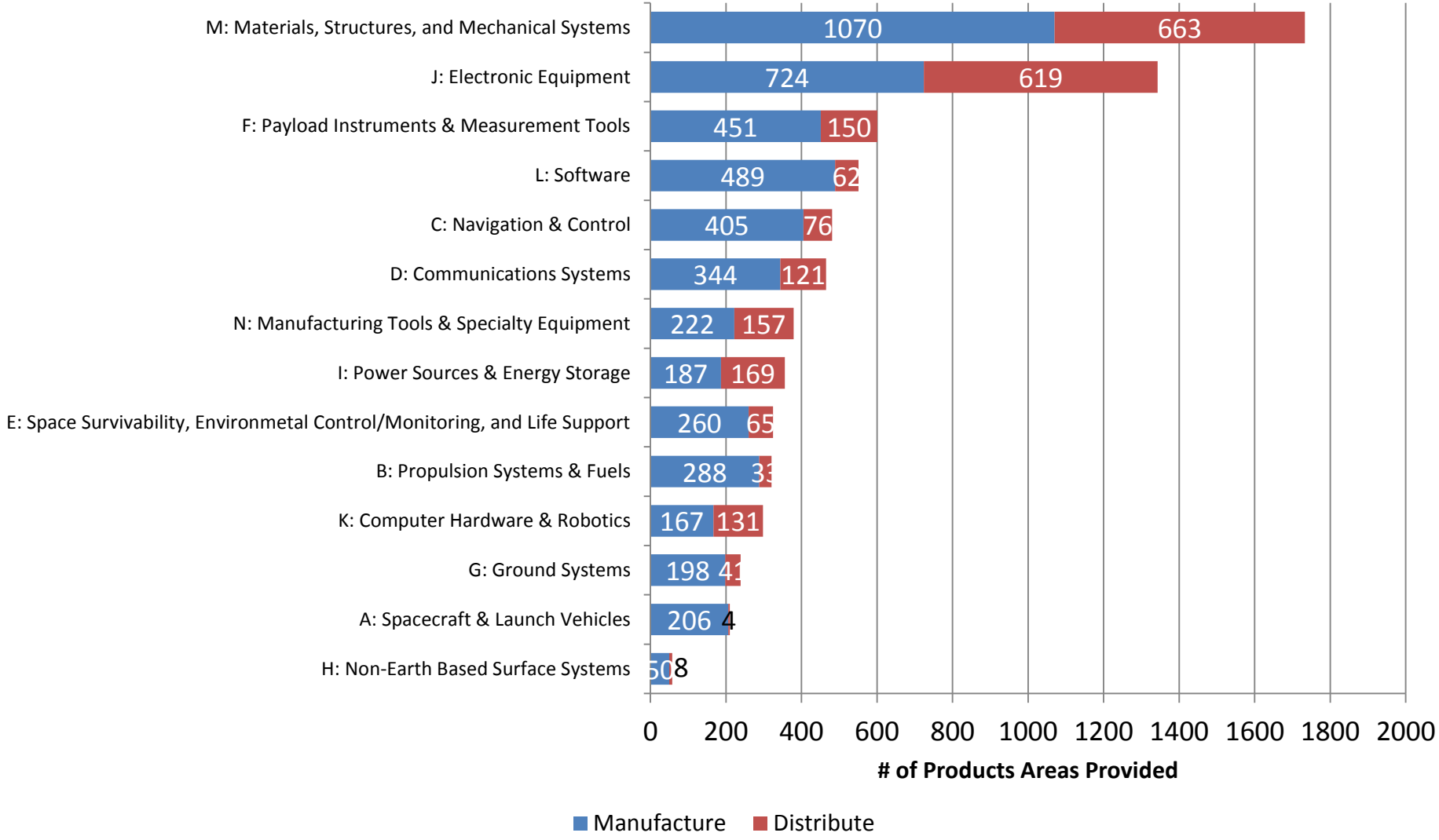
Products and Services Provided by Self-Identified Small Businesses*



* Based on 1,217 responses from self-identified small businesses. Includes all types of small businesses.

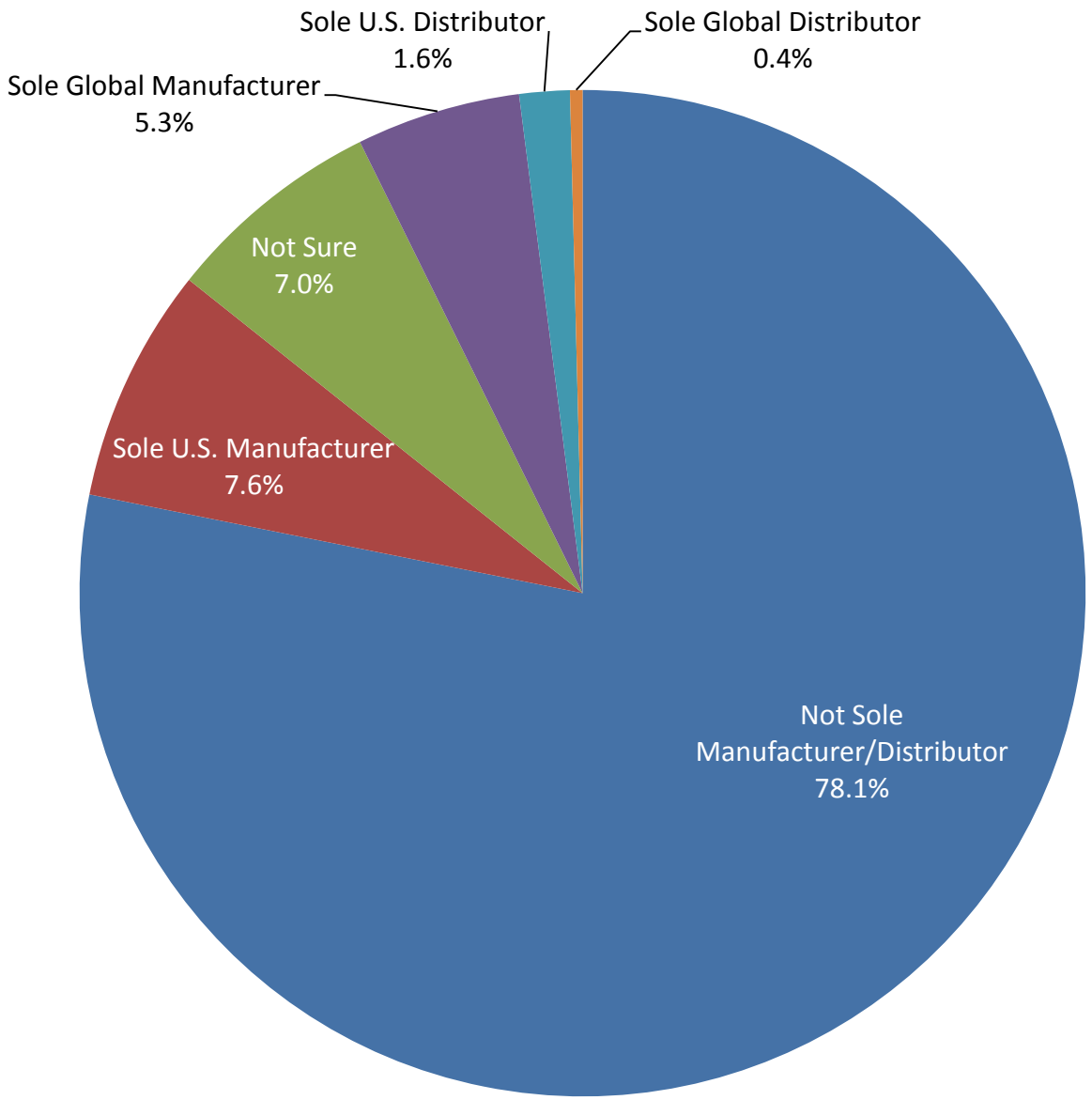
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Products Provided by Respondents – Manufacturing vs. Distribution



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

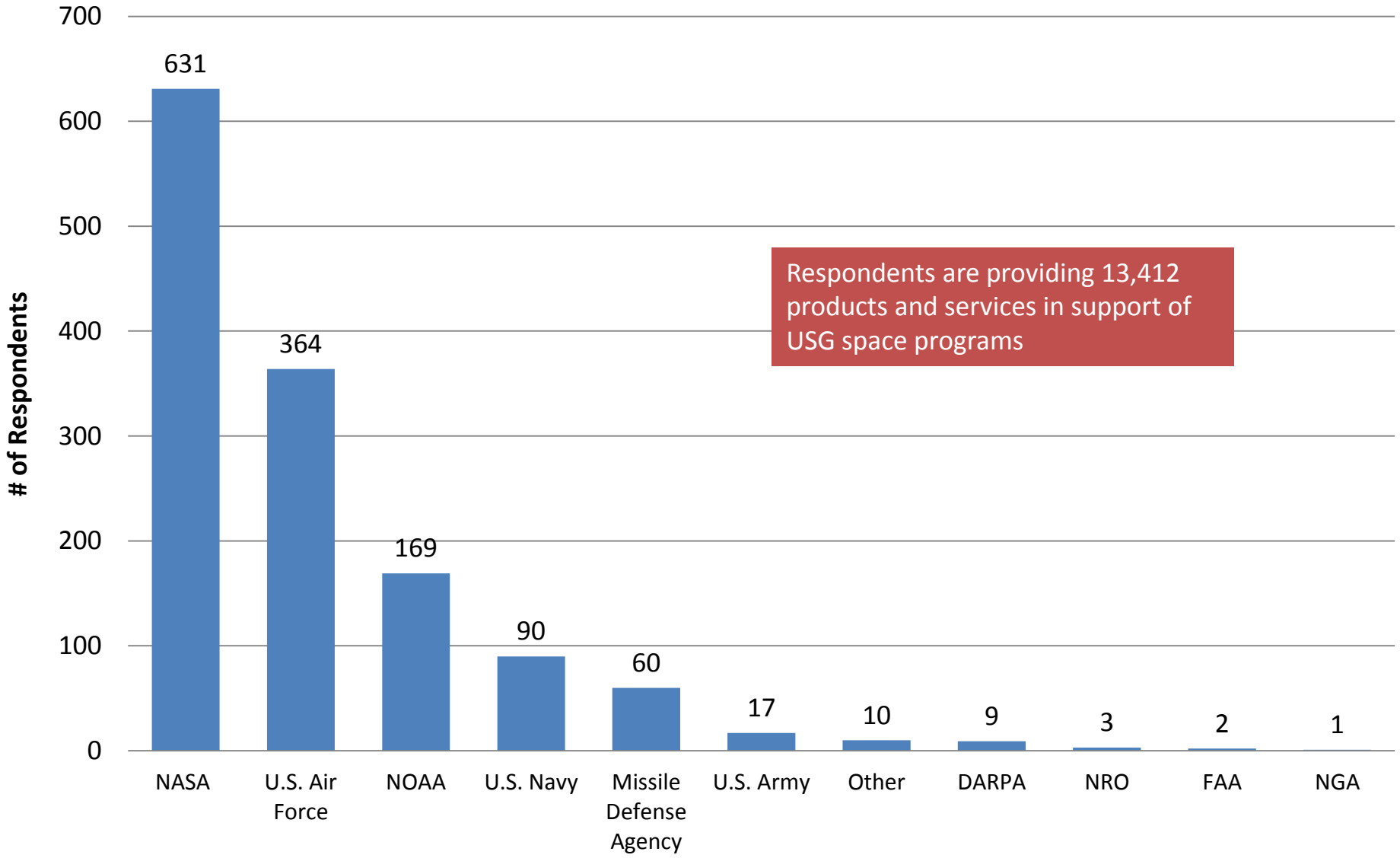
Sole Manufacturers/Distributors of Products*



* Based on the total number of product areas identified by respondents.

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

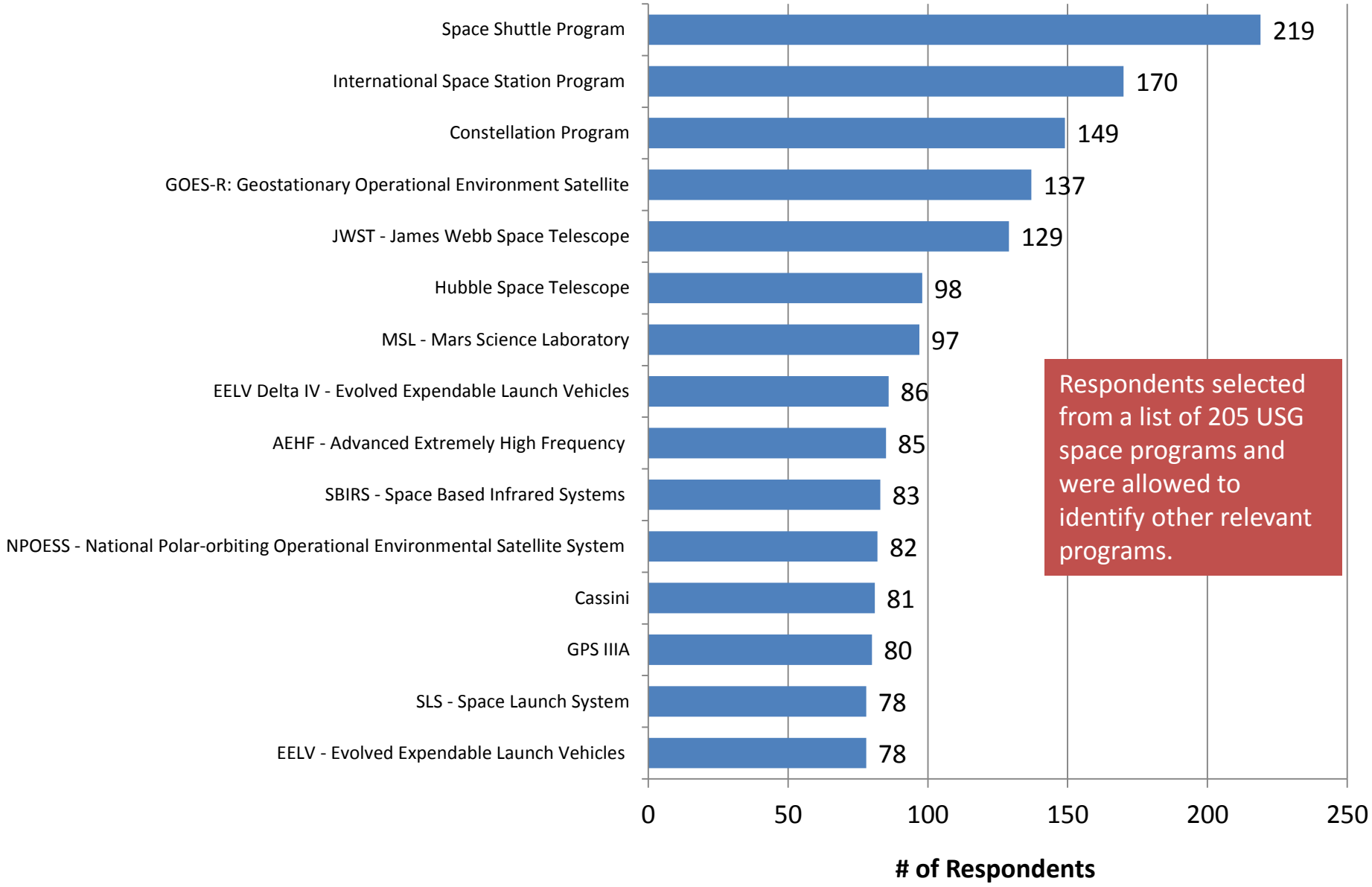
Support for Space Programs By USG Organization*



* Respondents identified direct support of a specific USG space program

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Support for USG Space Programs Based on Respondent Participation



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Critical Suppliers

- Respondents identified 4,607 unique, critical suppliers that support items on the Product and Service List.

- These suppliers most commonly supported respondents with materials, structures, and mechanical systems, electronic equipment, and services.

- Eleven percent of products and services provided to respondents were from sole source suppliers. Twenty-two percent of products and services were from single source suppliers.

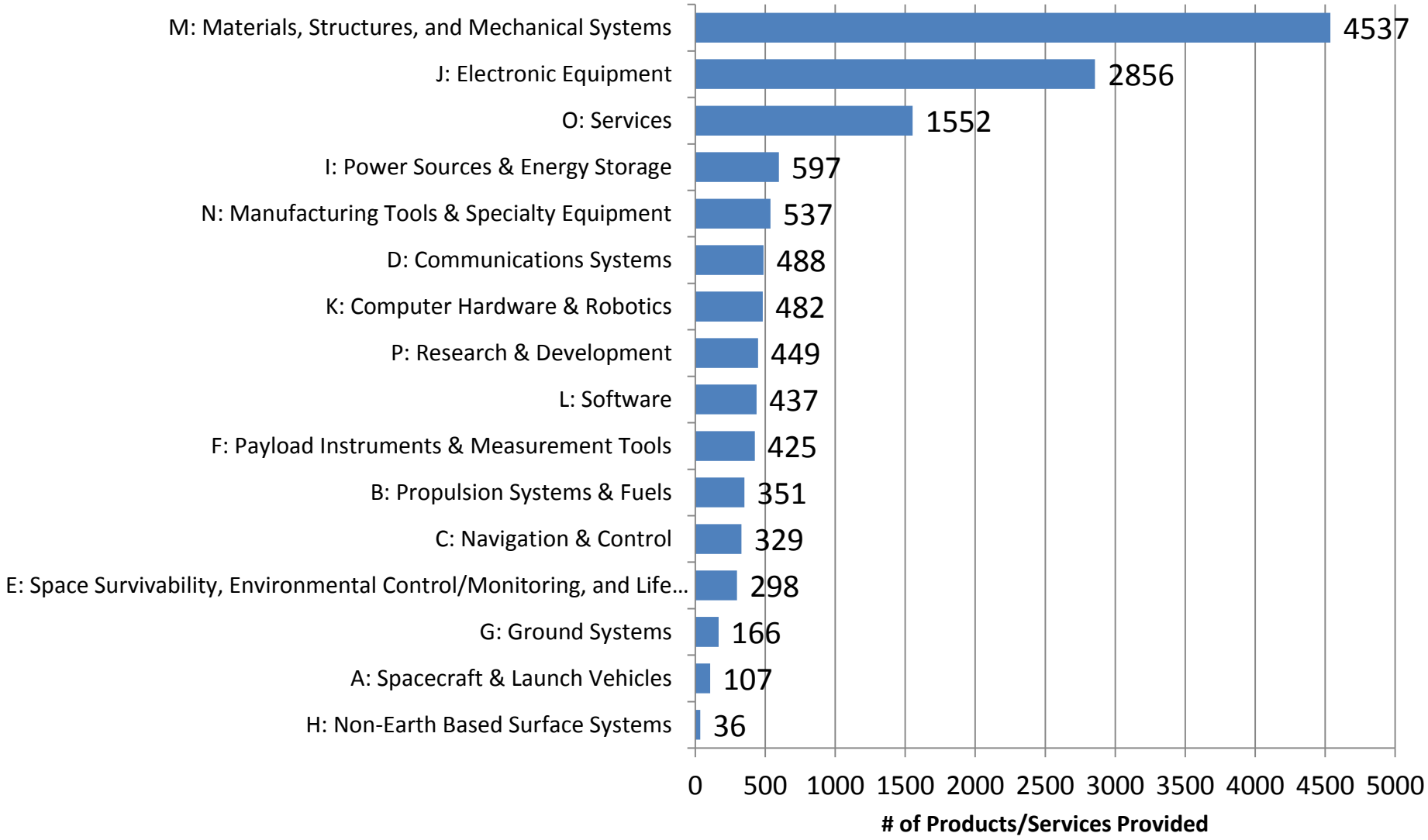
- Respondents identified critical suppliers from 56 countries.

  - Based on the number of products and services provided, the most prominent non-U.S. suppliers were located in Japan, Germany, Canada, France, and the United Kingdom.

  - Non-U.S. suppliers most commonly provided respondents with materials, structures, and mechanical systems, electronic equipment, and communications systems.

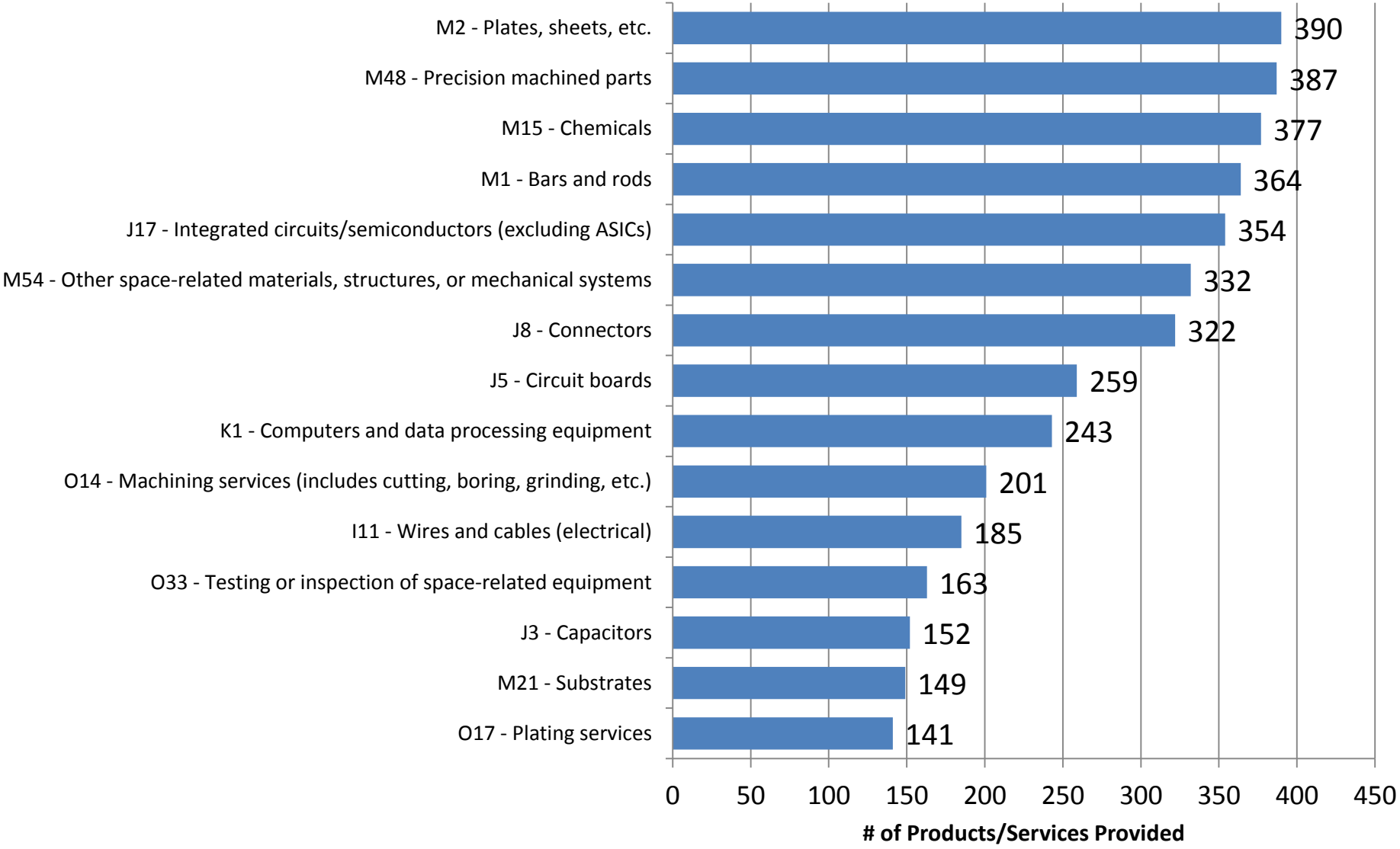
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top Products and Services Provided by Suppliers – by Product and Service Segment



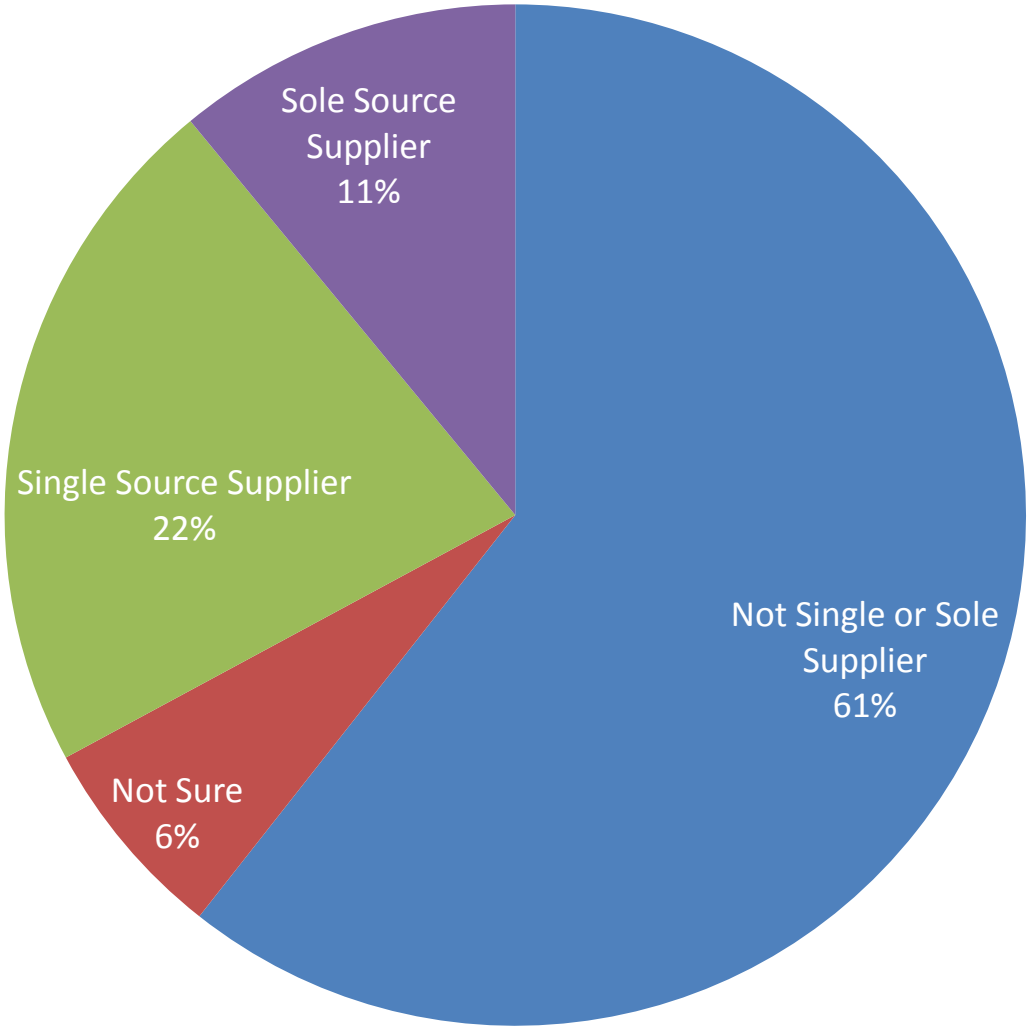
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product and Service Areas Provided by Suppliers



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

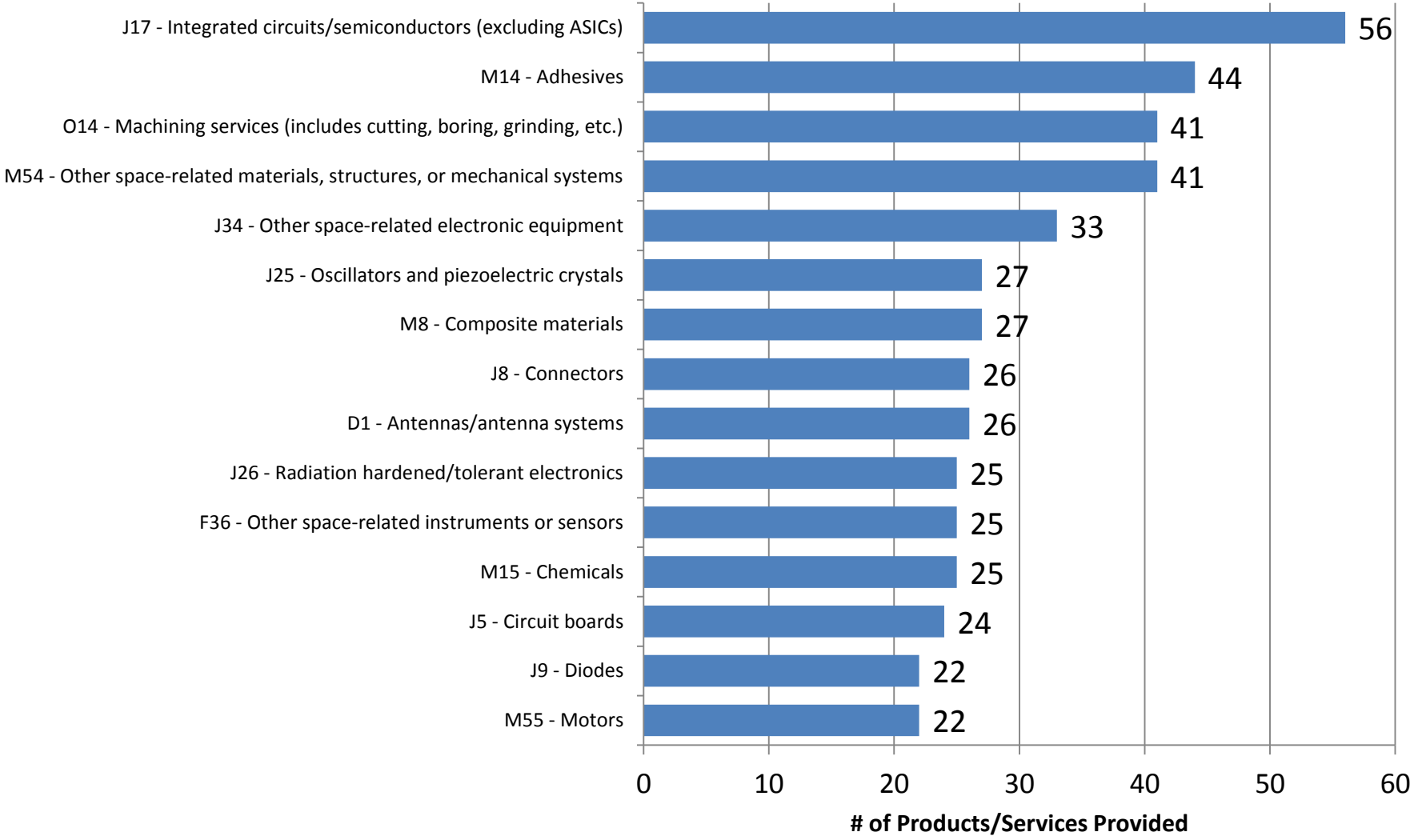
Single and Sole Source Suppliers*



* Based on the total number of products/services supplied

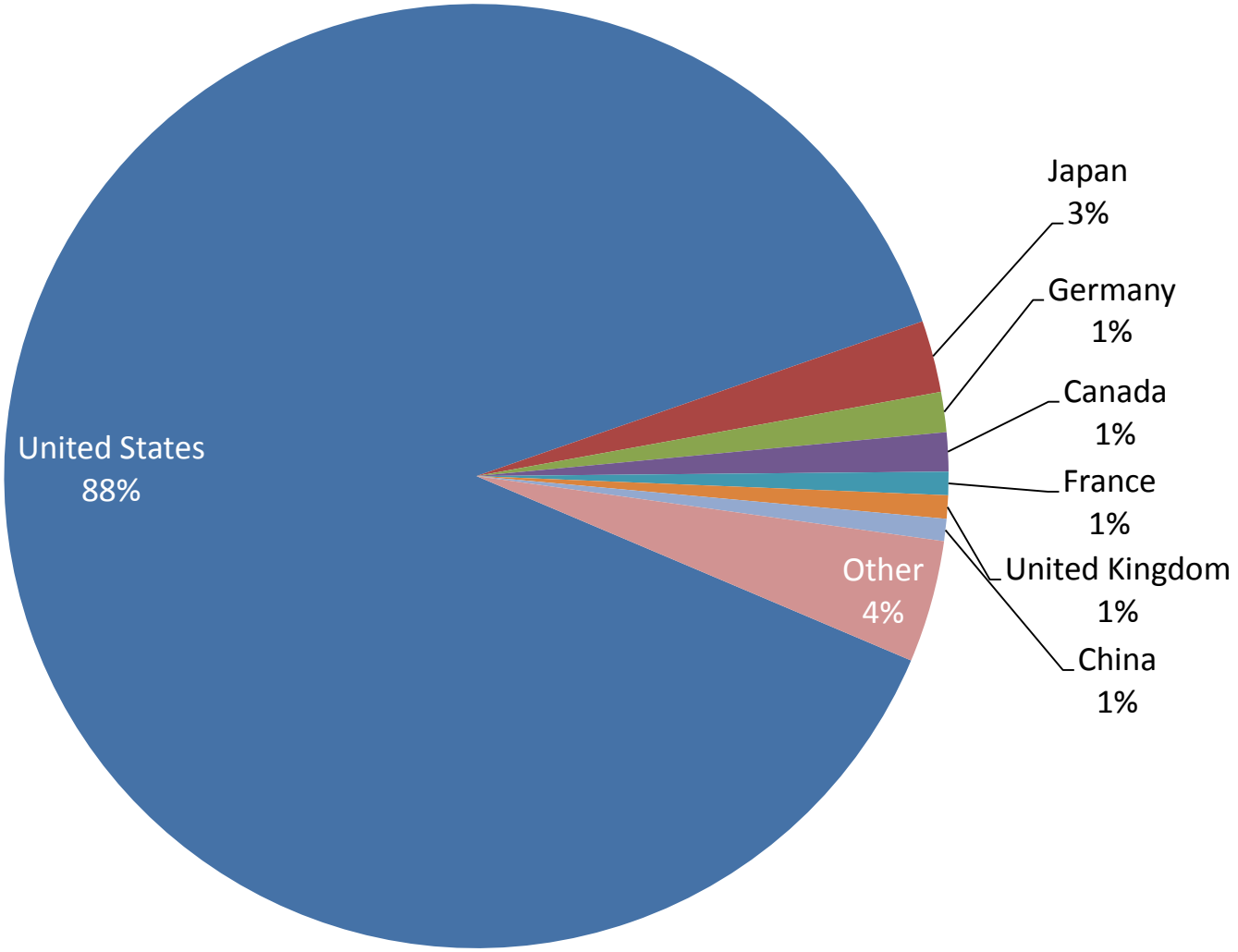
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product and Service Areas Provided by Sole Source Suppliers



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

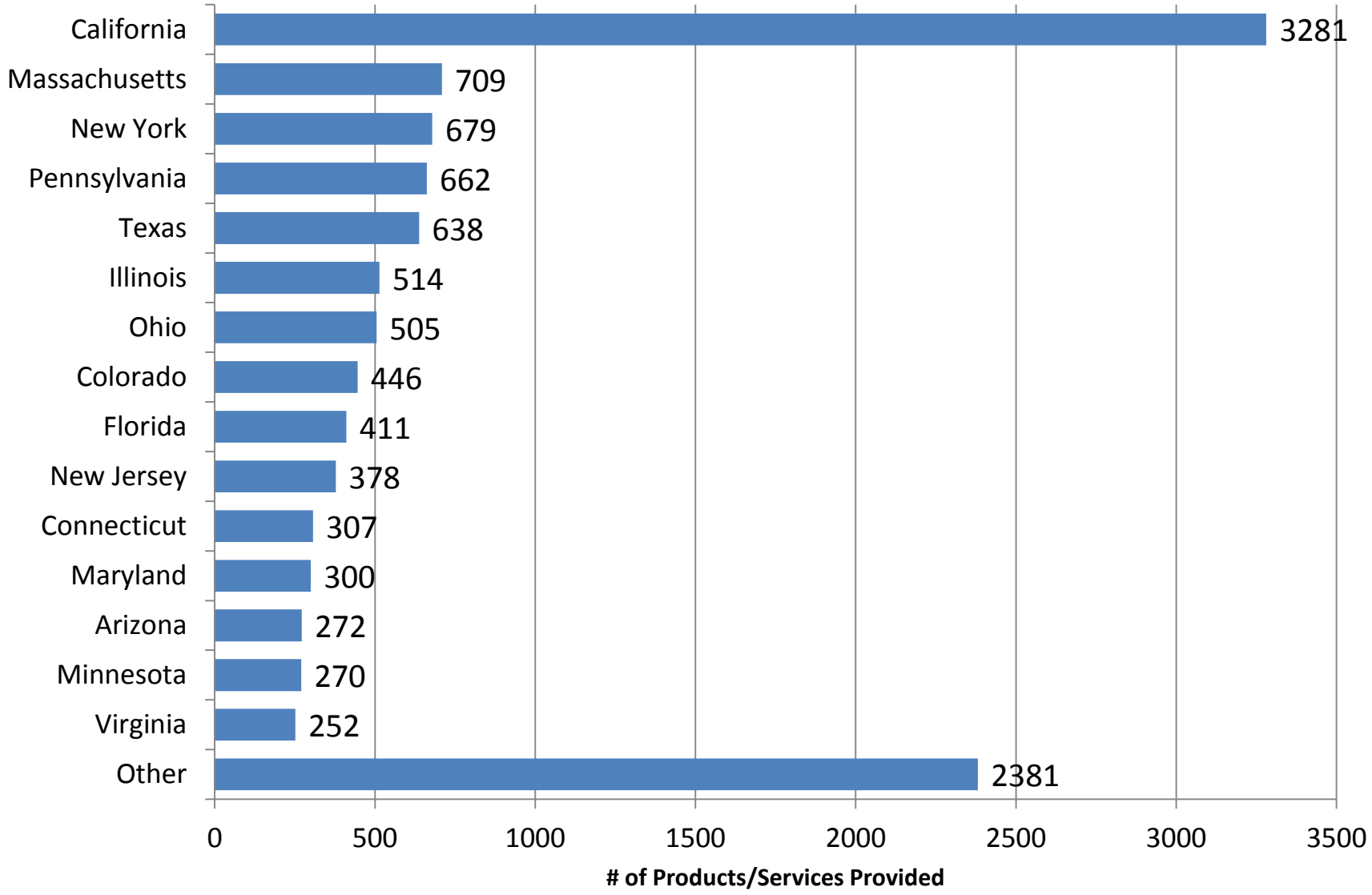
Location of Suppliers by Country*



* Based on the total number of products/services supplied

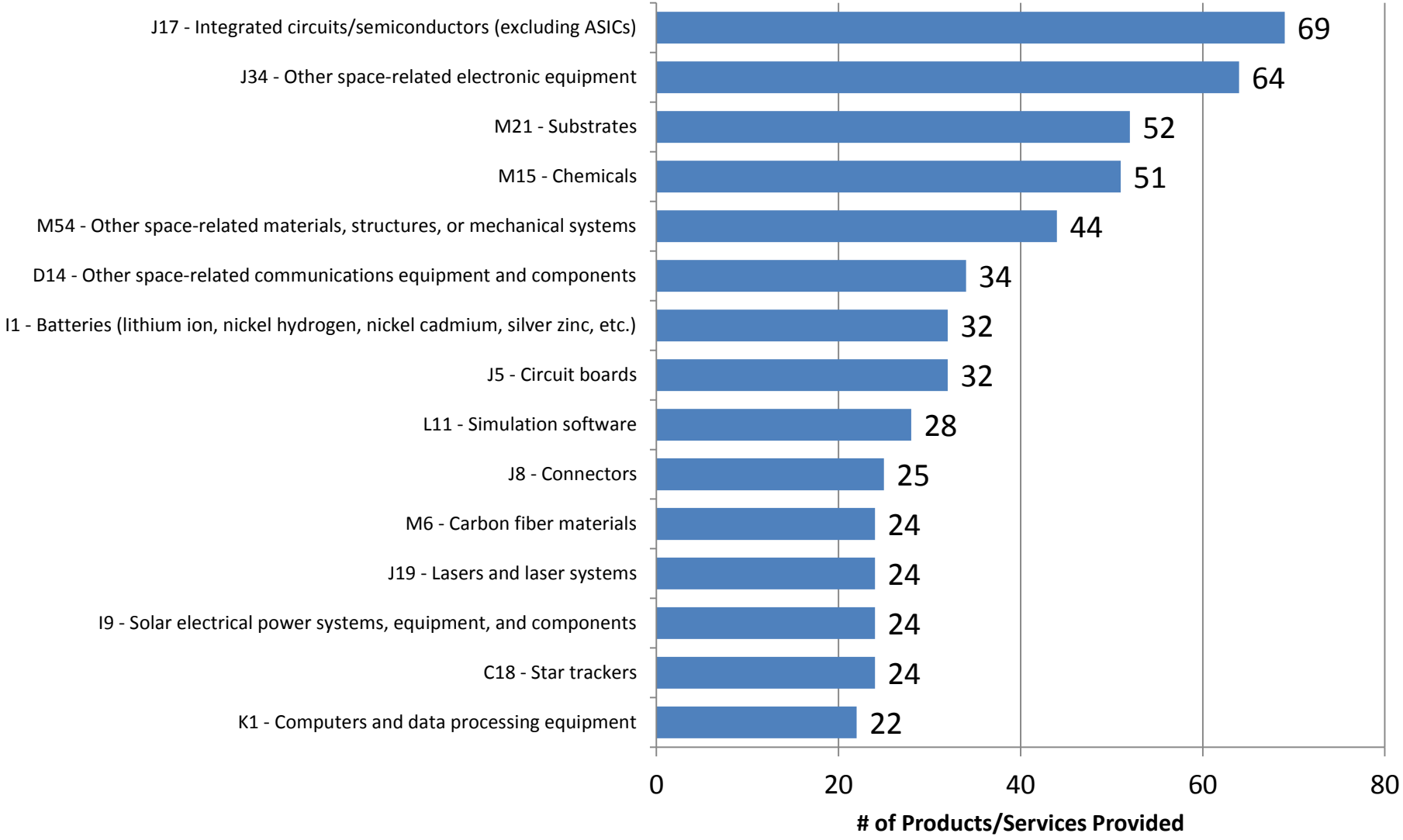
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

State Location of U.S.-Based Suppliers



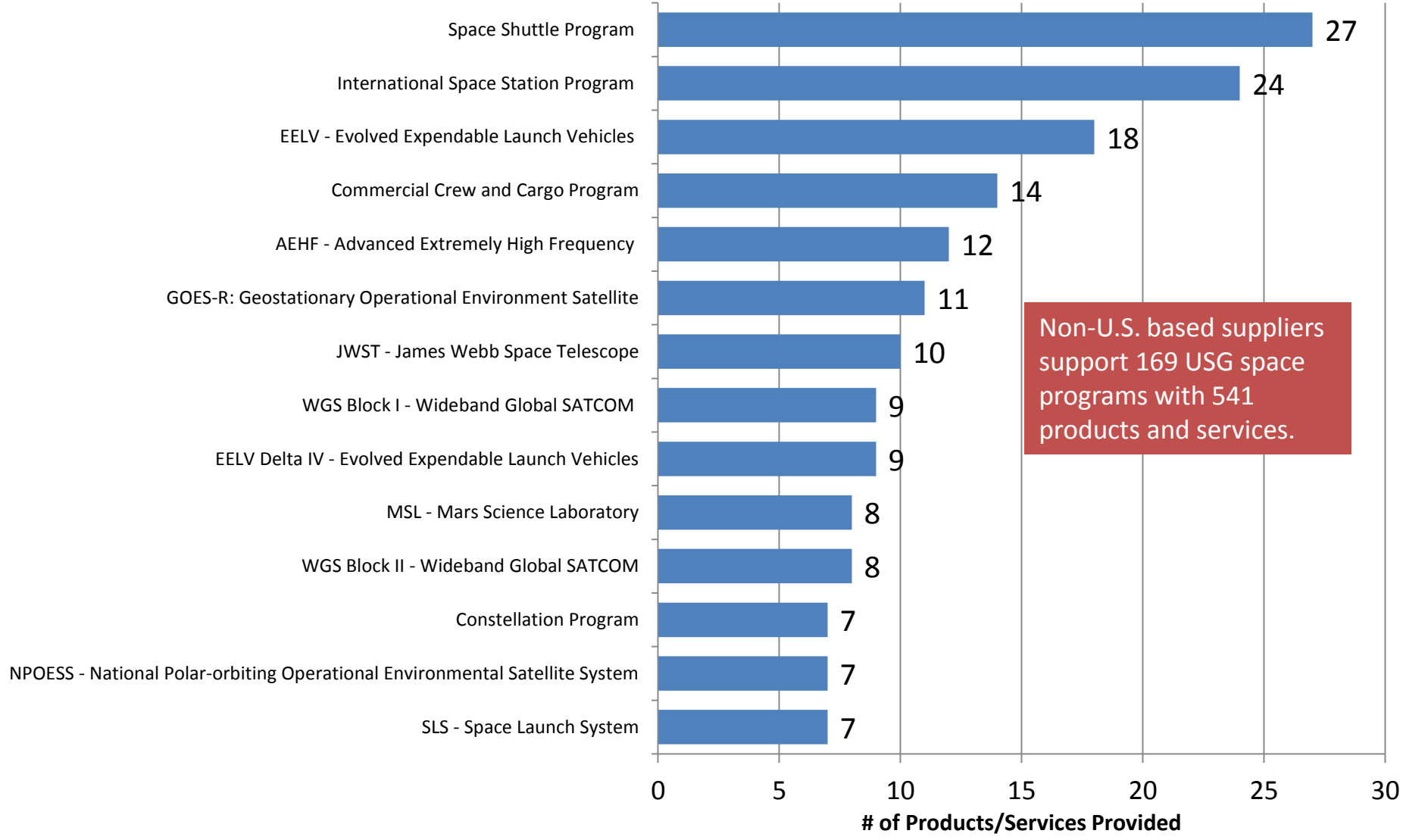
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product and Service Areas Provided by Non-U.S. Based Suppliers



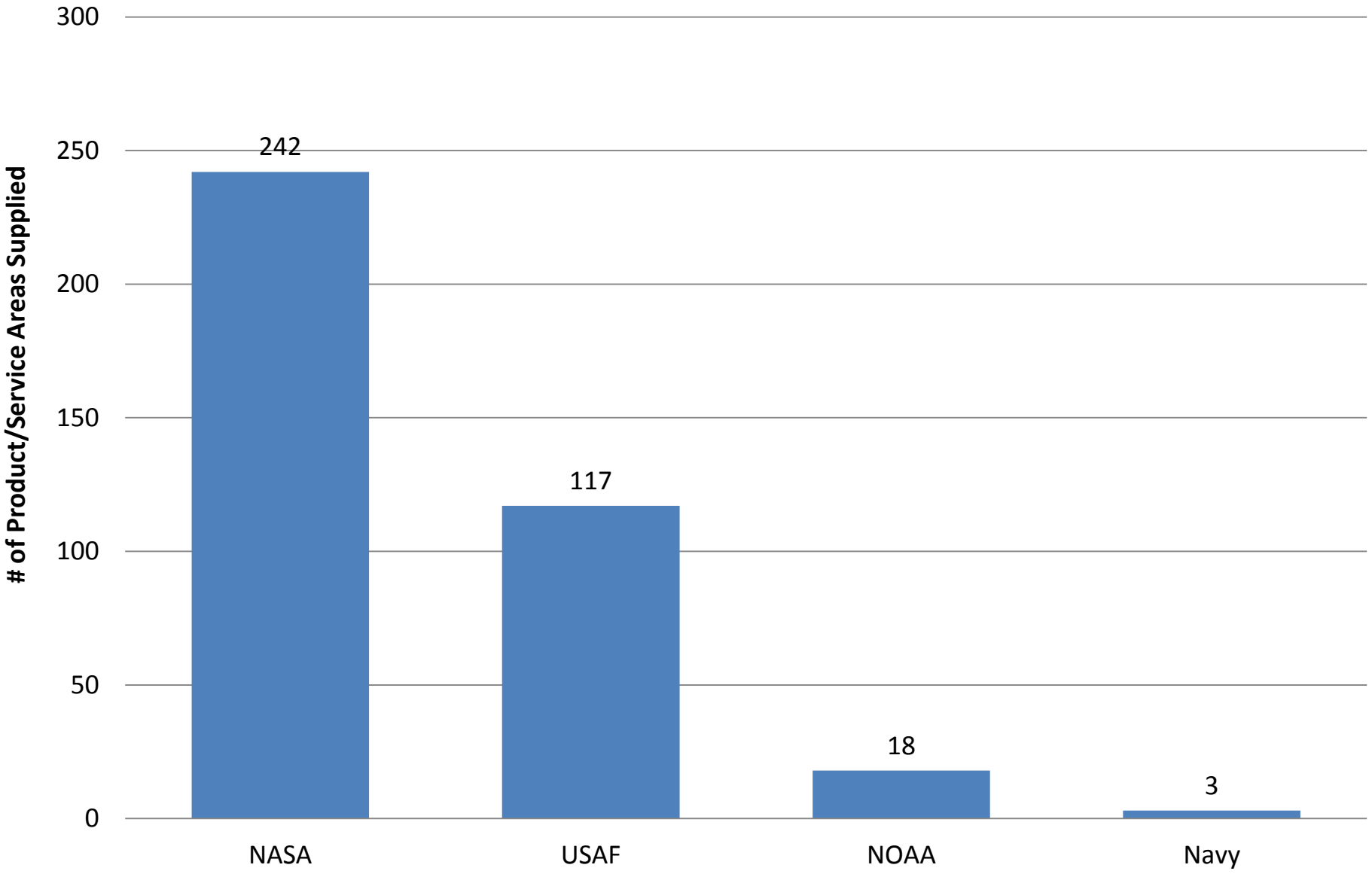
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

USG Space Programs with the Greatest Non-U.S. Based Supplier Support



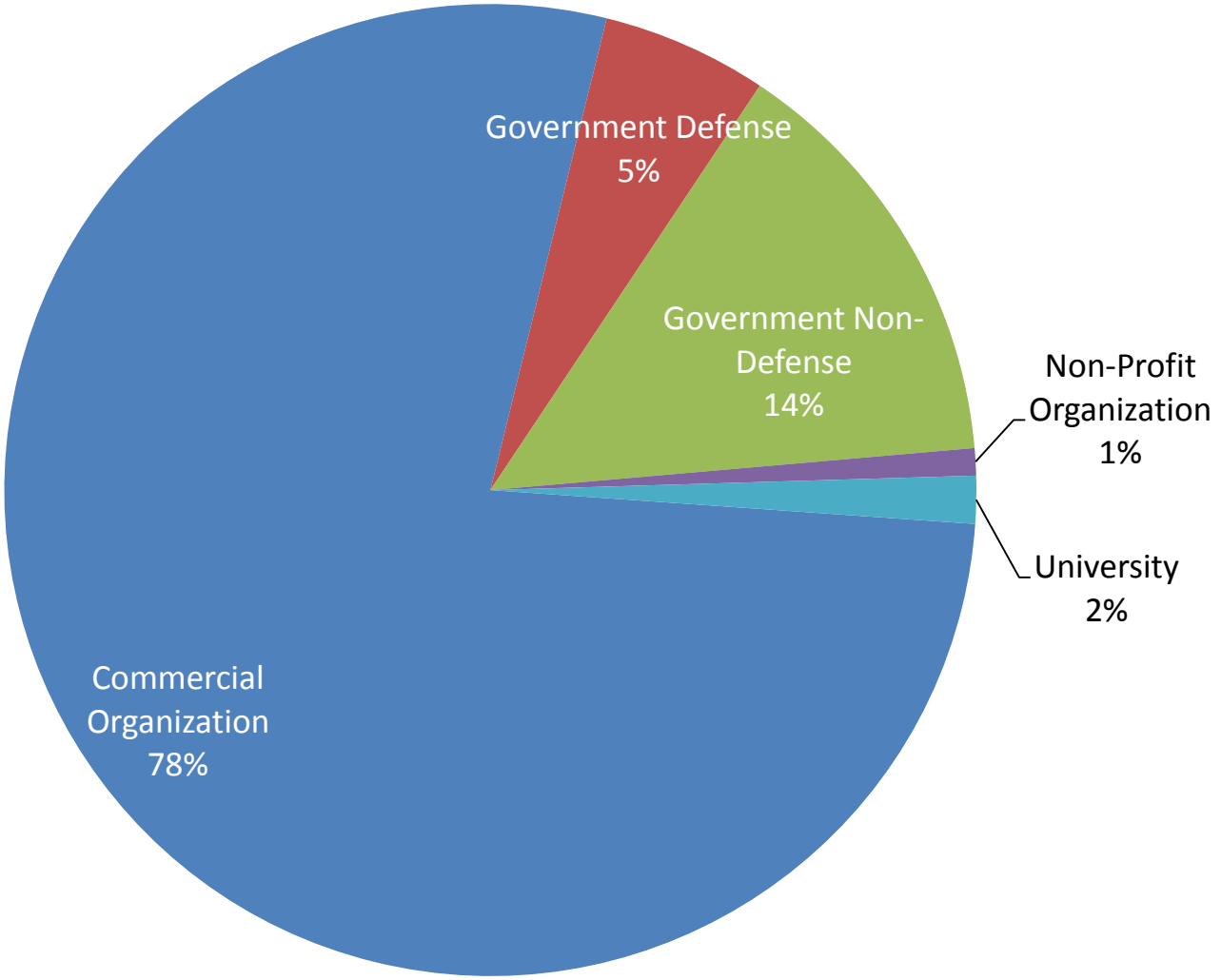
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Non-U.S. Supplier Support to USG Space Programs



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

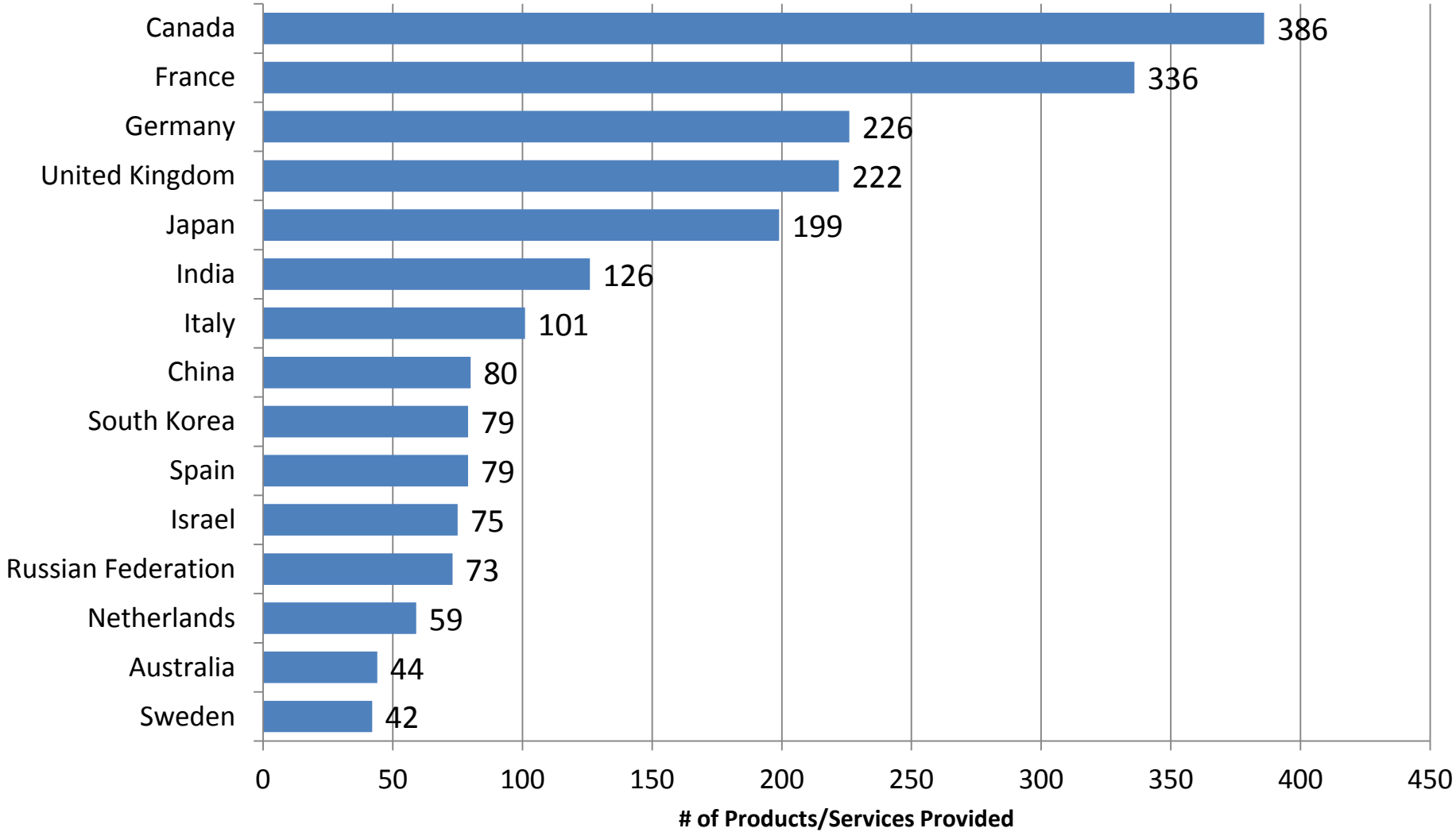
Type of Non-U.S. Based, Space-Related Customers*



* Based on the total number of products/services supplied

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 Locations of Non-U.S. Based, Space-Related Customers*

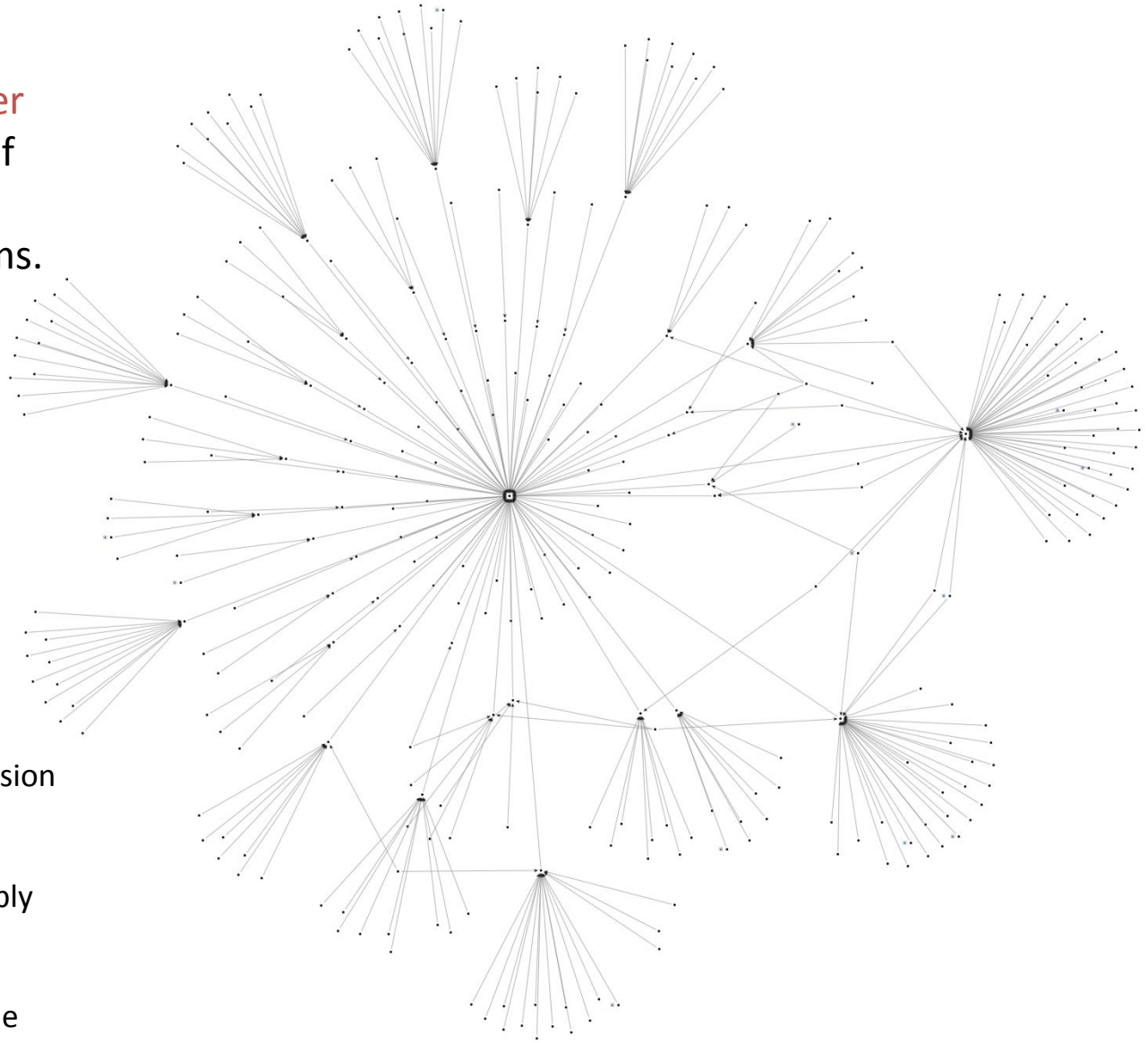


* Based on the total number of products/services supplied

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Utilizing the Data: Supply Chain Mapping
Mars Science Laboratory (MSL) Curiosity Rover

Linking Respondent, Supplier, and Customer data allows creation of detailed supply chain maps for USG programs.



Customer – NASA Jet Propulsion Laboratory (at center)

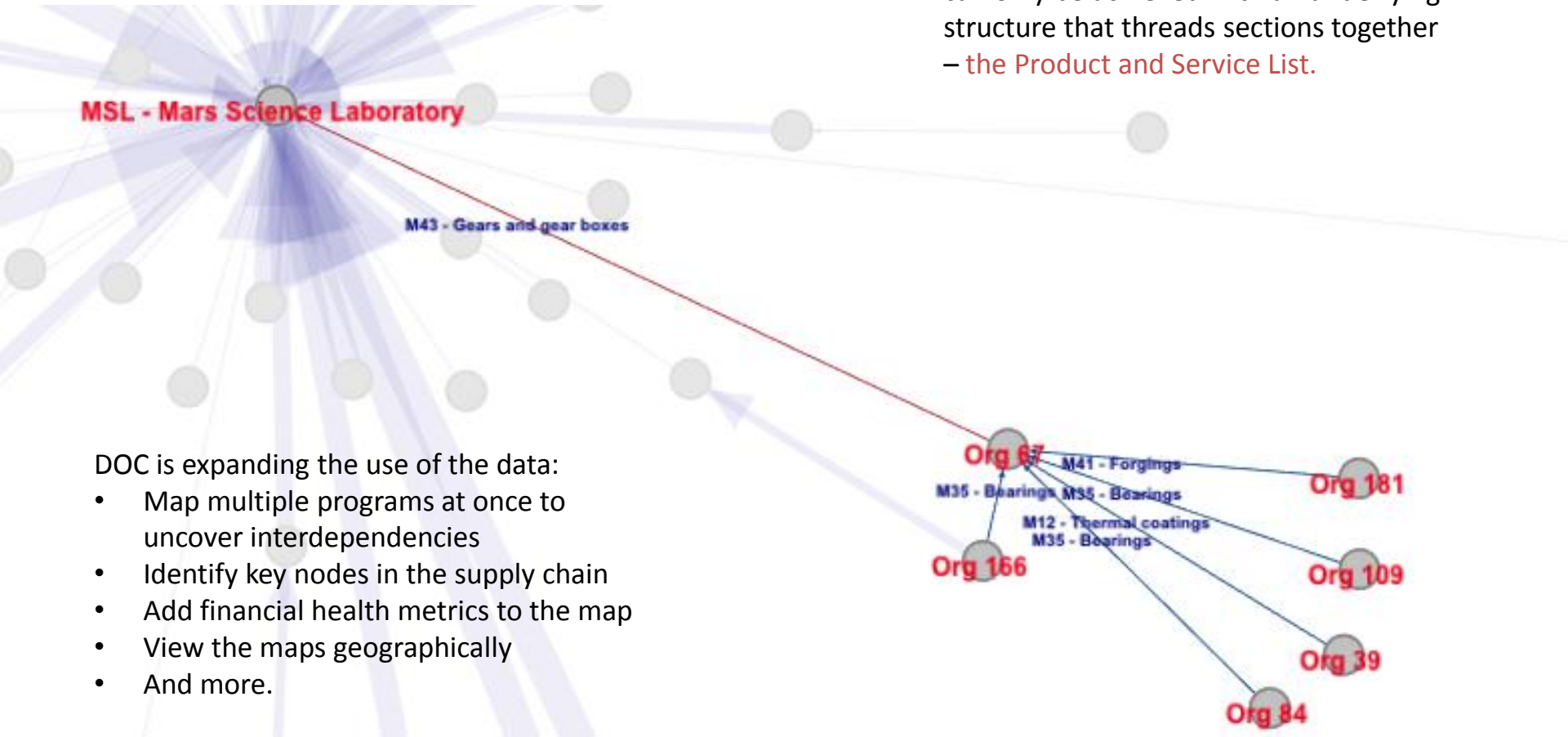
Approx. five tiers of the supply chain are represented

As more data is collected, the map will grow

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Mars Science Laboratory (MSL) Curiosity Rover - Detailed View

This level of detail in supply chain mapping can only be achieved with an underlying structure that threads sections together – the Product and Service List.



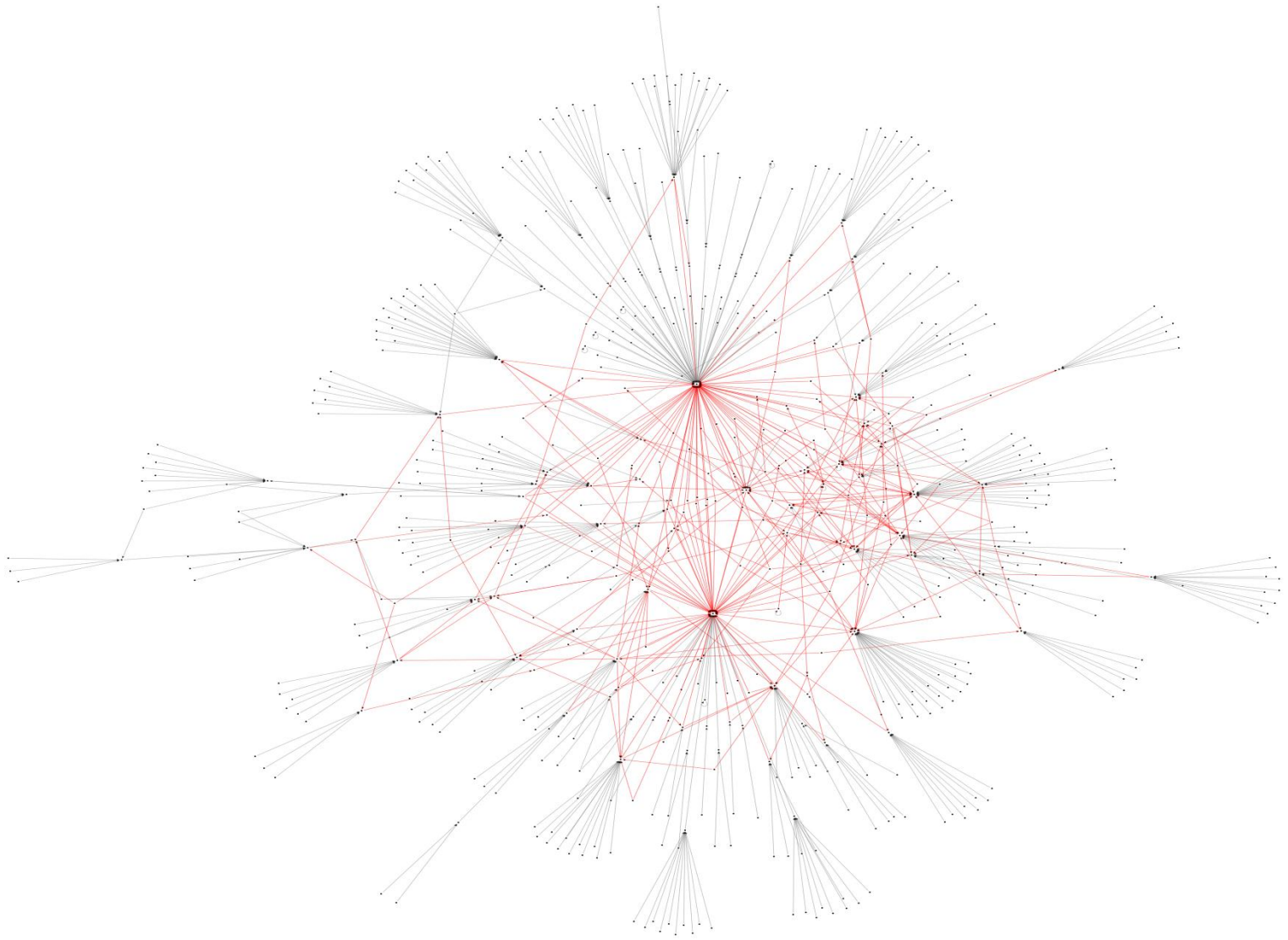
DOC is expanding the use of the data:

- Map multiple programs at once to uncover interdependencies
- Identify key nodes in the supply chain
- Add financial health metrics to the map
- View the maps geographically
- And more.

Partner organizations can tailor these maps to their specific needs.

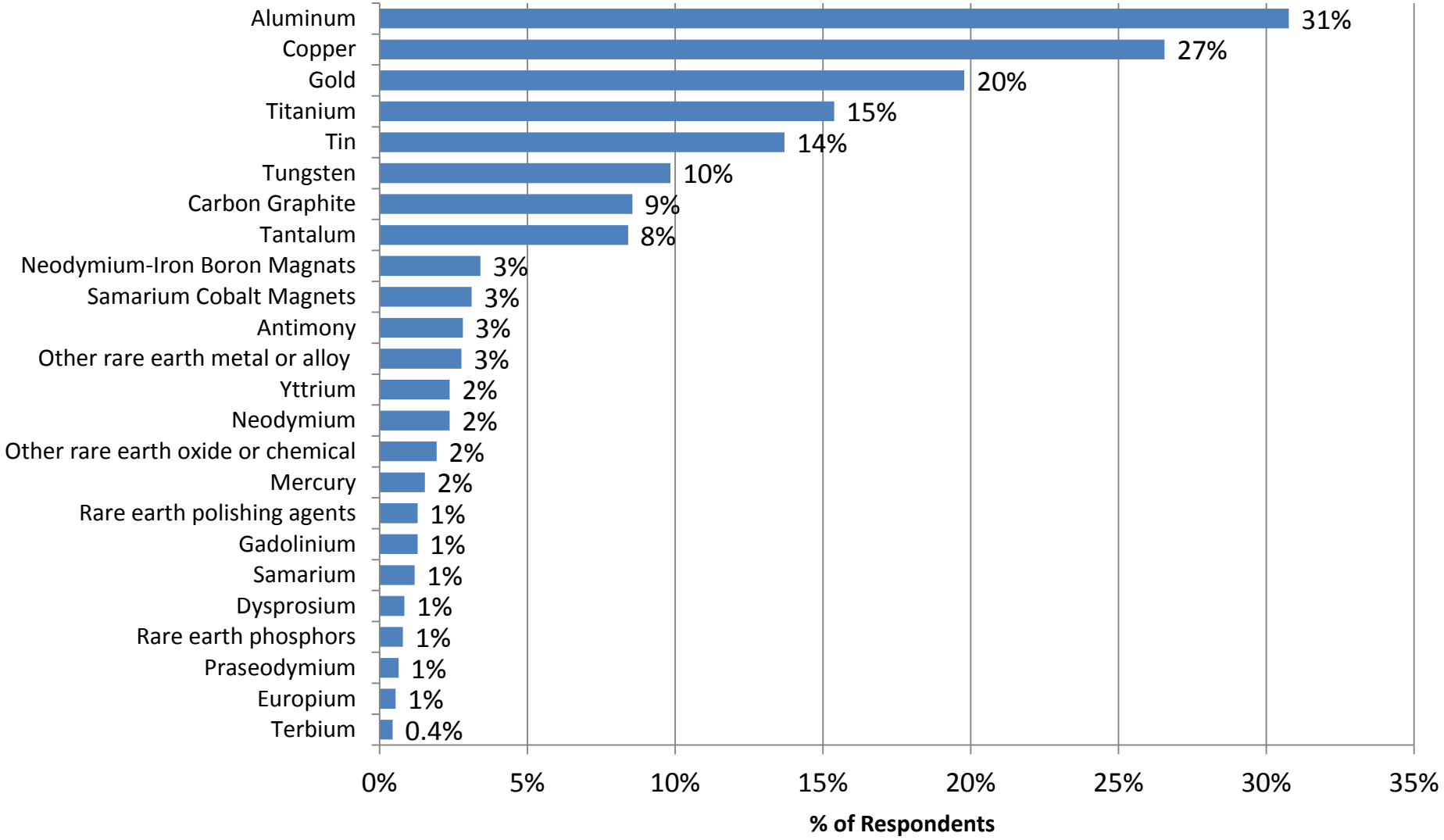
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Mapping Multiple Space Programs: James Webb Space Telescope (JWST) and the Evolved Expendable Launch Vehicle (EELV)



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Use of Rare Earth and Other Elements for Space-Related Production Processes or Final Products*



* Based on 2,022 total respondents.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Space-Related Operations Adversely Impacted by Issues with Rare Earth or Other Elements	
Issue	**Percentage of Respondents**
Sharp Changes in Market Price	20.8%
Decrease in U.S. Availability	10.6%
Increase in U.S. Demand	7.8%
Increase in non-U.S. Demand	6.4%
Decrease in non-U.S. Availability	4.7%
Other	1.9%
*As a percentage of 850 respondents utilizing at least one of the elements identified in the survey	

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Adverse Impacts on Space-Related Operations due to Issues with Rare Earth or Other Elements

- "Sharp changes in market prices for copper may impact our business where we may not be competitive." –Very small company
- "Limited number of US producers and decreasing supply of domestic graphite." – Medium company
- "Fewer sources of US materials has forced the company to locate potential sources overseas." – Small company
- "Many prices for "rare earth" related materials have increased in price due to market speculation." – Very small company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Manufacturing Capacity Utilization Rates

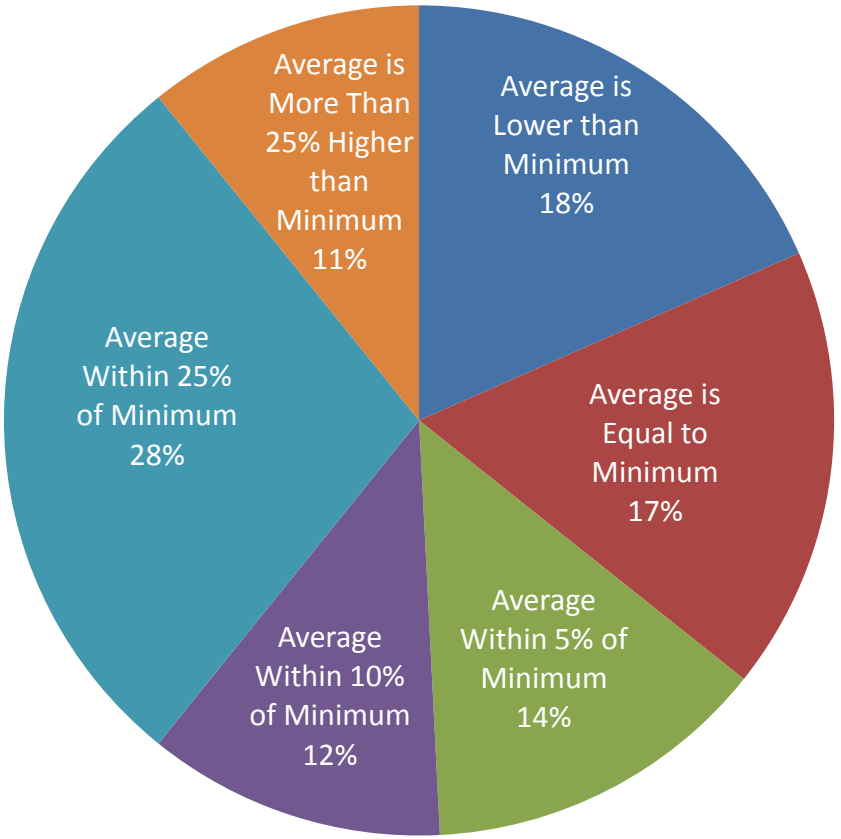
Respondents were asked to provide:

a) Their manufacturing capacity utilization rates for 2009-2012; and

b) An estimate of the minimum level capacity utilization to keep production costs from changing disproportionately to order volume.

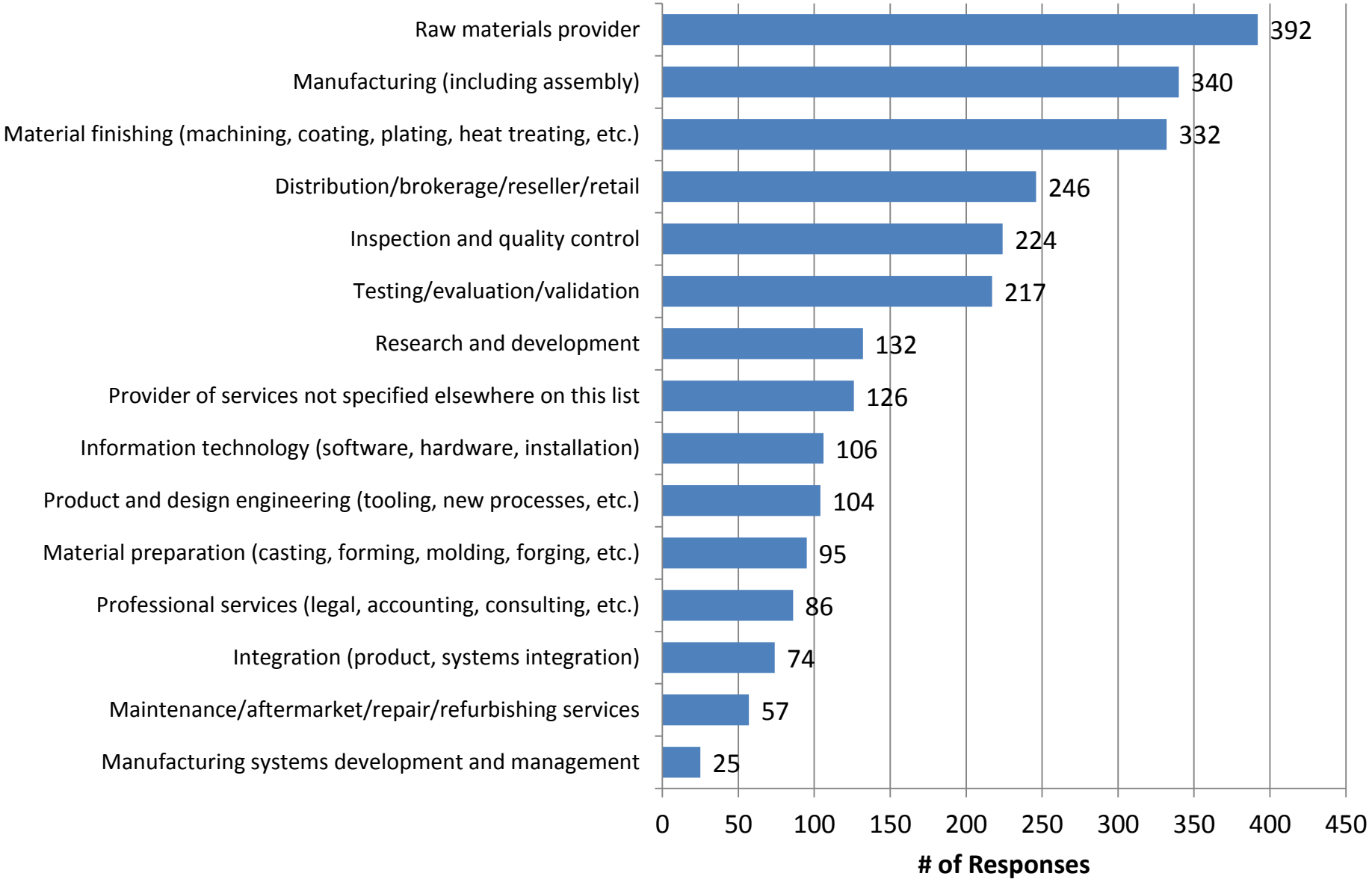
How close are these respondents to these identified minimum levels?

Proximity of Average Capacity Utilization Rate to Stated Minimum Utilization Rate



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Most Challenging Type of Outside Support Operations



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

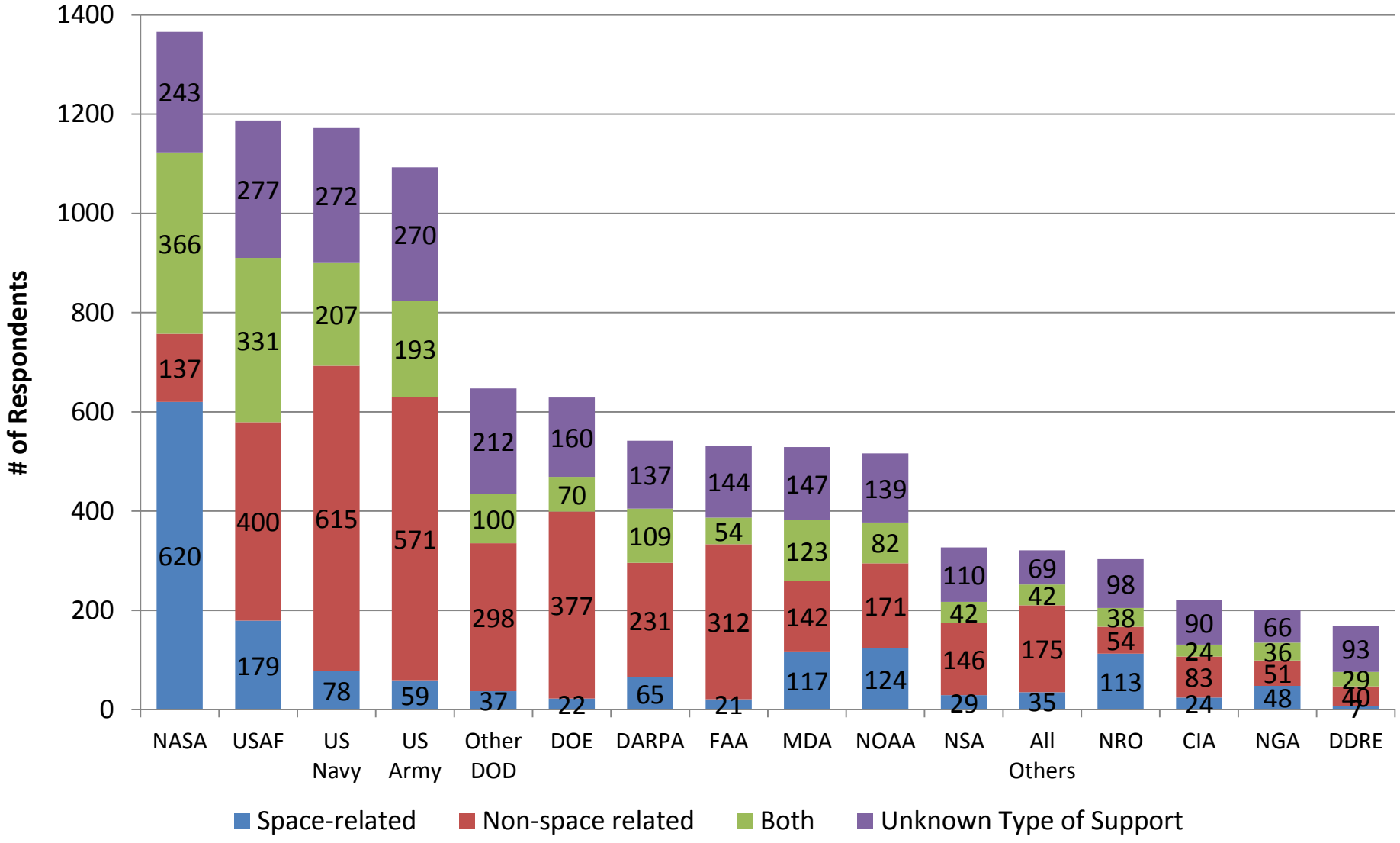
Encounters with Counterfeits

- From 2009-2012, 175 respondents encountered counterfeits in some form.
  - Of these, 71 respondents do not have a formal, written protocol for handling, documenting, and reporting incidents of counterfeits.
- Overall, **74 percent** of respondents do not have a formal protocol for handling counterfeits.
- 66 percent of respondents involved in manufacturing (including assembly) do not have a formal protocol for handling counterfeits.

Type of Counterfeits	# of Respondents
Electronics	104
Materials (metals, alloys, elements, etc.)	29
Other types of Counterfeits	20
Software	17
Fasteners	15
Testing procedures and/or documentation	13
Power source or energy storage equipment	8
Mechanical systems (hydraulics, gear boxes, etc.)	3
Systems/sub-systems (navigation, communication, propulsion, etc.)	3

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

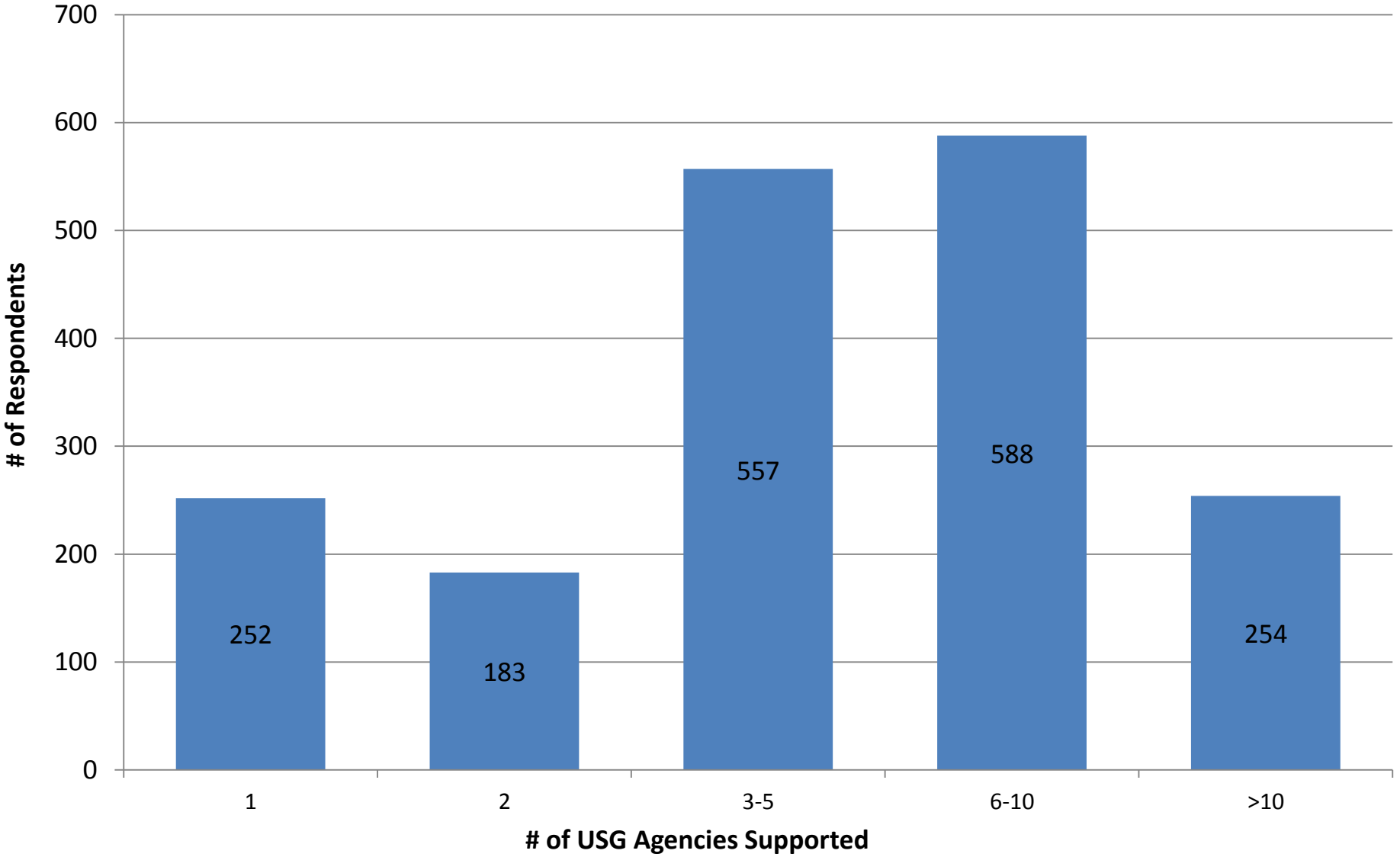
Support for USG Agencies*



* This identification of support is not tied to a specific USG program.

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

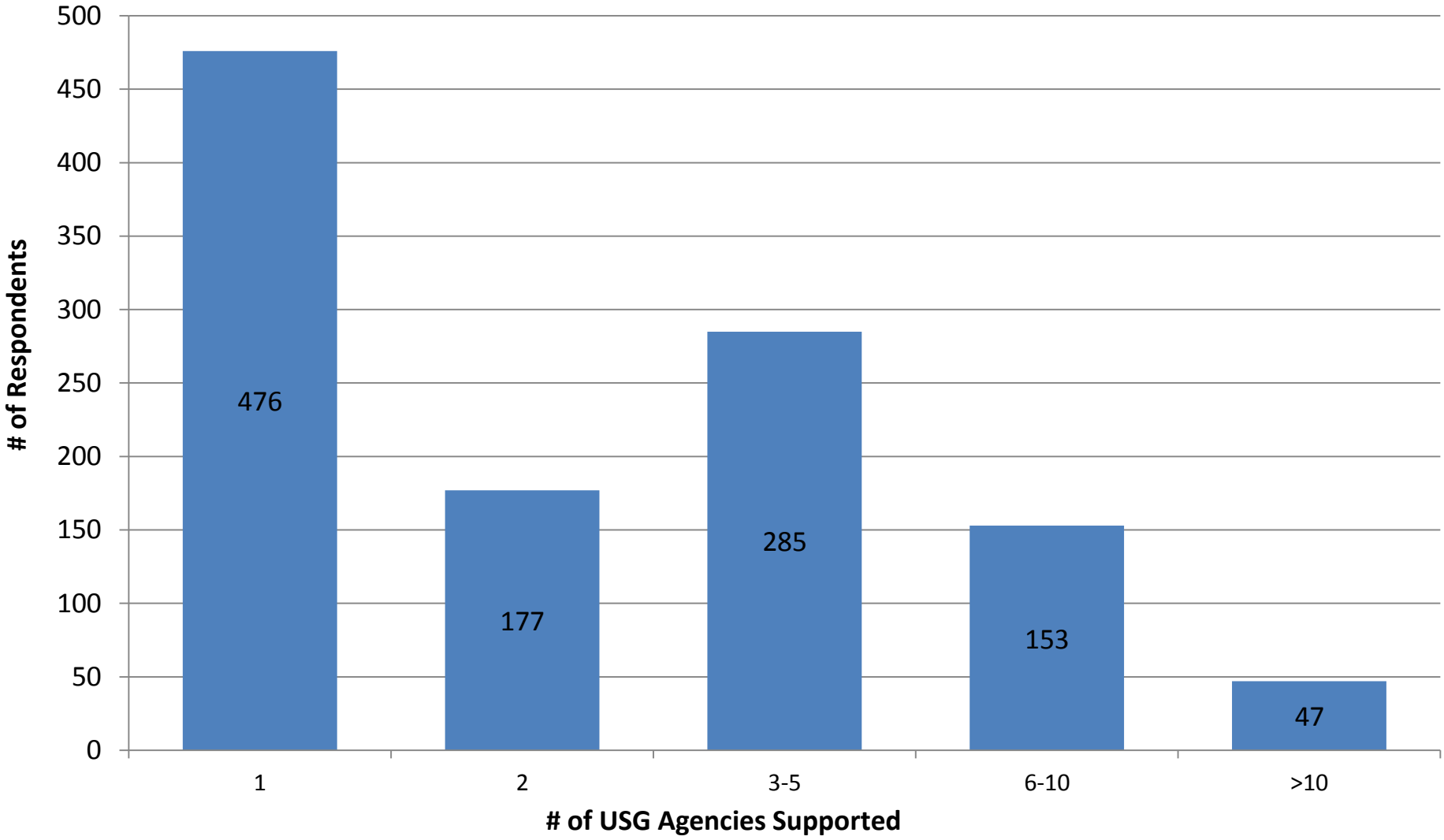
Respondents Supporting Multiple USG Agencies*



* Based on any type of support.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

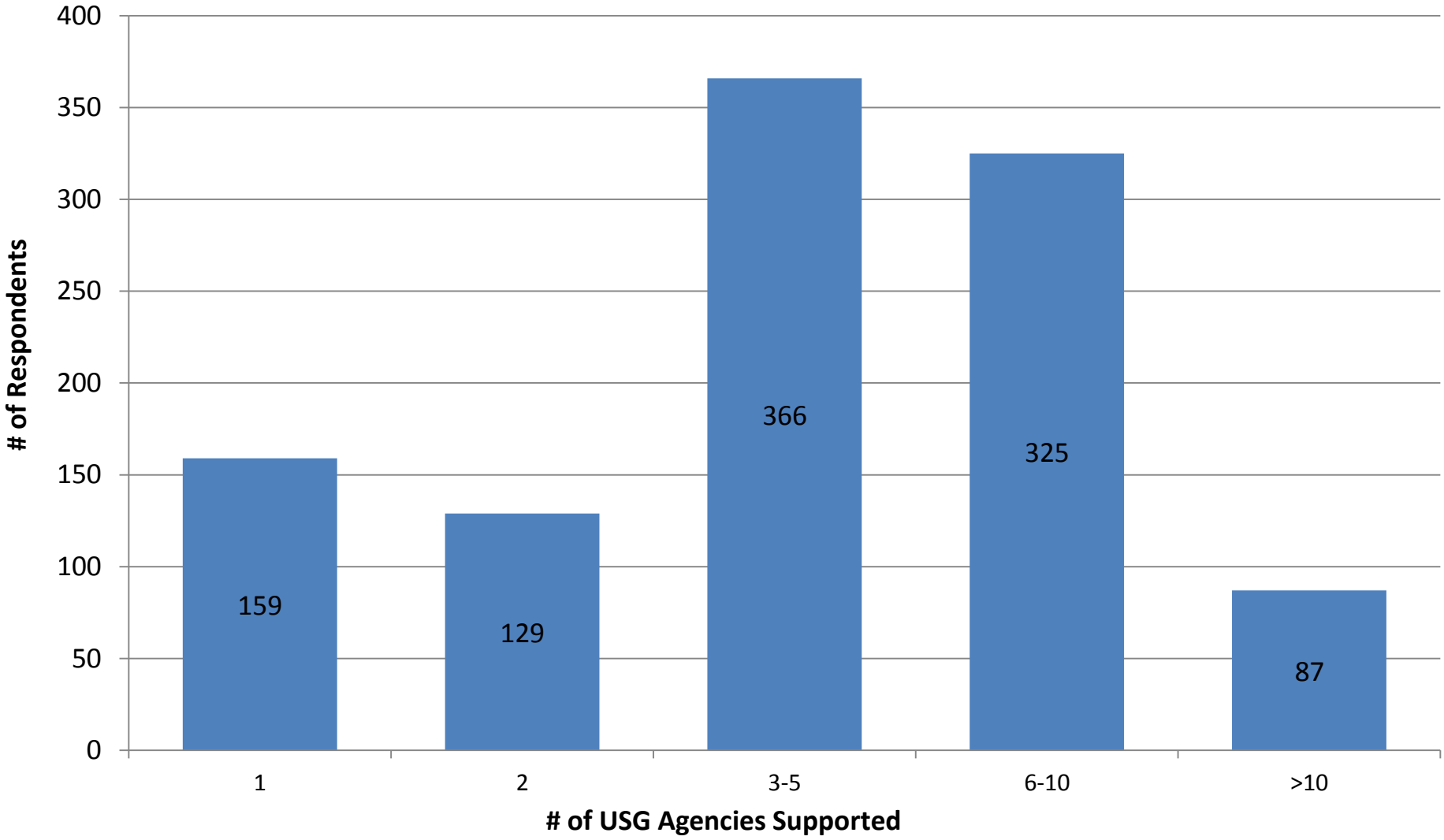
Respondents Providing Space-Related Support to Multiple USG Agencies*



* A combination of "space-related" support and "both" responses.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

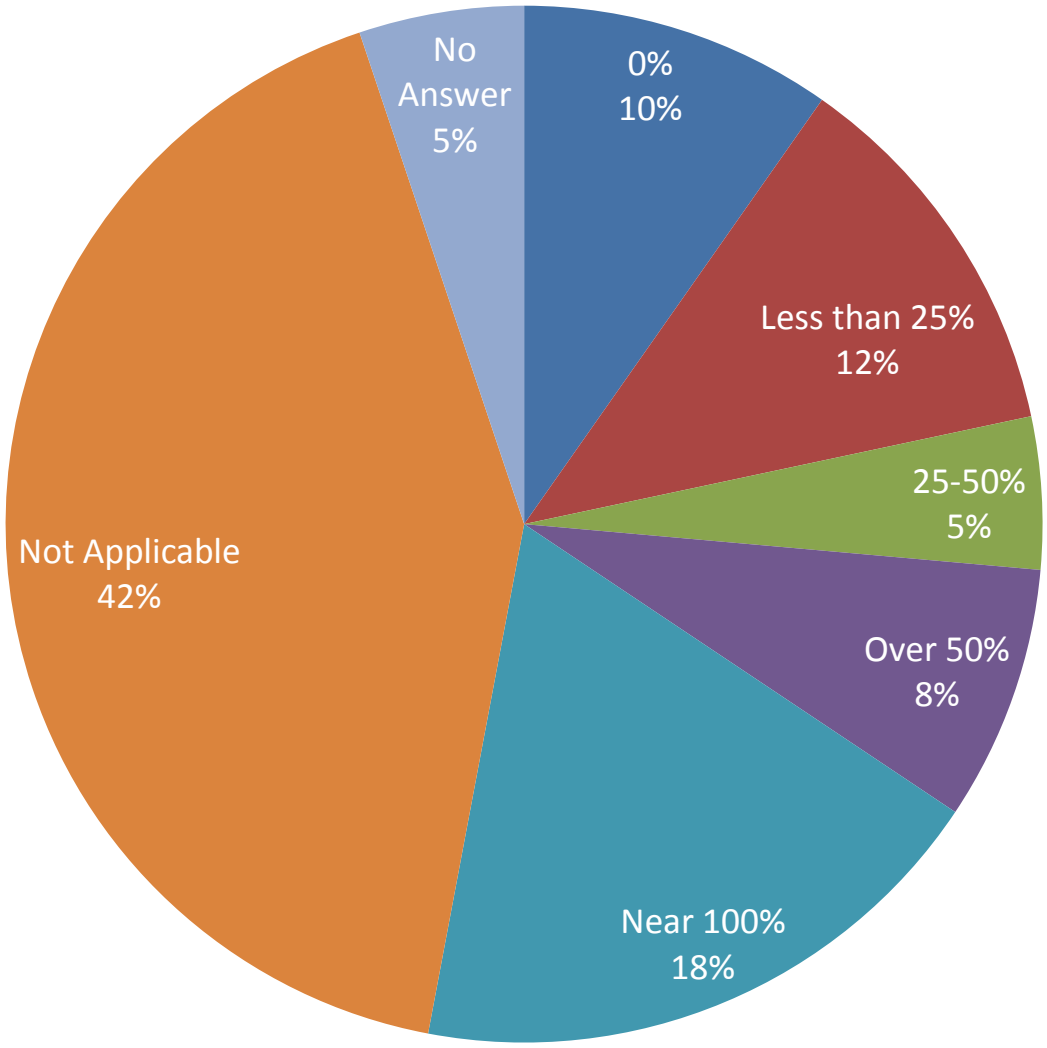
Self-Identified Small Businesses Supporting Multiple USG Agencies*



* Based on any type of support.

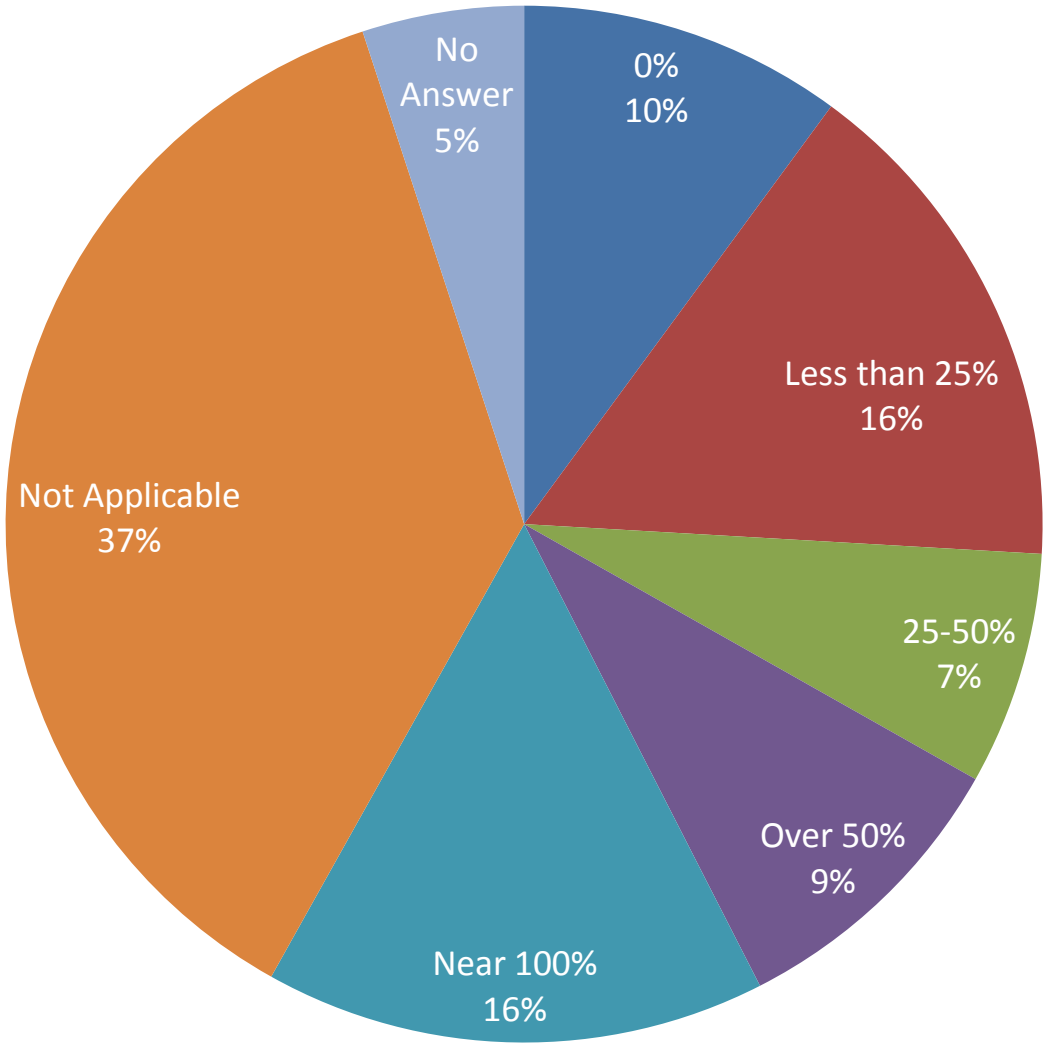
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Compatibility of USG Space-Related Products/Services with Commercial Space-Related Products/Services



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Compatibility of Respondents' Space-Related Products/Services with Non-Space related Products/Services

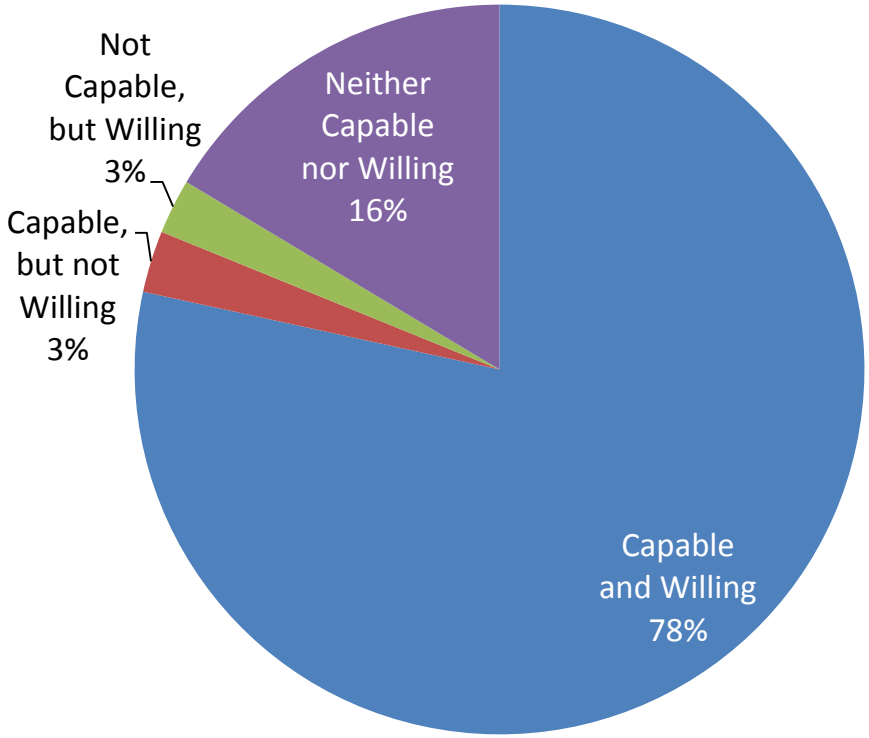


Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Respondents' Willingness and Capability to Provide Specialty, Low-Volume or One-Time, Space-Related Products/Services to the USG

Themes:

- Contracting
  - Quicker and cleaner
  - More direct (less use of primes)
- Variability of Funding
  - Consistency
  - Better communication of strategic planning
  - Demand forecasting
- Broader Customer Base
  - Relax U.S. export controls



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

Theme: Contracting

- "Almost 100% of our space related sales are custom designed and manufactured equipment for space simulation (thermal chambers). It would help us if contracts required more evidence of previous success because we've lost contracts to suppliers who bid lower than we did because they had never made similar systems and had no idea of the work that was involved." - Very small company

- "…The government contracting mechanism was vastly more efficient and easier to understand then that provided by the subcontract management company. Why not further simplify such contracts to make it even easier for small businesses, and let NASA directly contract as often as possible?" – Very small company

- "DARPA has a cyber fast-track program that can make a decision and put small businesses on contract within 2 weeks of receipt of proposal. If the space-related government did that, we could give them more responsive service." - Very small company

- "Although unlikely, directly contact us about opportunities. Our organization does not have time available to try to navigate the complicated bidding process."- Very small company

- "Please do not waste my time or my team's time…and contract directly with the company instead of using a contractor. The bullying tactics being used and the hundreds of hours of time wasting busywork they require has led to several no-bid responses to contracts that only [we] could perform. Last year, I spent TEN MONTHS negotiating with one of the large prime contractors for ONE instrument sale. Their terms were completely unacceptable. In contrast, the same type of sale to an export customer took less than two weeks, the contract was 4 pages long (instead of 27!) and was in two languages…I have had our government prime contractors take more than 6 months to pay on services contracts where I had been paying employees for the hours worked under that contract. I've been told from other small business owners that this has become the norm. -No thank you." – Very small company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

Theme: Contracting (cont.)

- "Eliminate or reduce any additional communication, approvals and documentation that is above what is required by our non-government related customers." - Small company
- "Be specific in the related Statement of Work (SOW) and/or performance specifications and provide in a timely manner such that proposals can be prepared well planned, documented and submitted." – Medium company
- "Provide grants instead of contracts that bear full overhead for the University and do not have onerous restrictions that prevent us from accepting contracts in an open academic environment" – University
- "We only do business with private enterprise since the requirements of providing products and services for the government are much higher and more restrictive." – Very large company
- "Yes, get us involved at the design stages for material requirements and we can help you to design lower-cost materials need for use in space" – Medium company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

Theme: Variability of Funding

- "Get Congress to pass the national authorization and appropriations bills on time so our Government contracts don't get constipated during Continuing Resolution Authority (CRA) scenarios! We recently had to lay off high-tech staff for whom we couldn't cover payroll despite having been selected for NASA contracts that would have covered their payroll -- NASA couldn't award the contracts due to CRA. in other cases, we've had severe cash flow crises when incremental funding on existing contracts was delayed due to CRA. It's insane that we can't depend on the Government to fund us on time for effort for which we we're staffed on the basis of selected or awarded contracts." – Small company

- "More consistent funding. We waste a lot of time bidding for projects that never get funding." – Medium company

- "Establish a space policy to require interagency interoperability of space-related product. Aggregate hardware demand and collaborate with demand forecasting and planning while pooling funding with similar product. Eliminate redundant procurement, logistics processes, and sources of supply. Pursue agile manufacturing and supply chain management/Product Lifecycle Management disciplines" – U.S. Government Agency

- "Fund the materials up front to take this burden and risk off of the manufacturer." – Very small company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

Theme: Broader Customer Base

- "At this point, international space or privately-funded space activities would be the only alternatives to sustain our company if the US government became a low-volume customer of ours. ITAR stands as a barrier to the international customer base, and the privately-funded space activities are still very immature." – Very small company

- "Clearly define the difference between space-related products that are ITAR vs. EAR controlled." – Large company

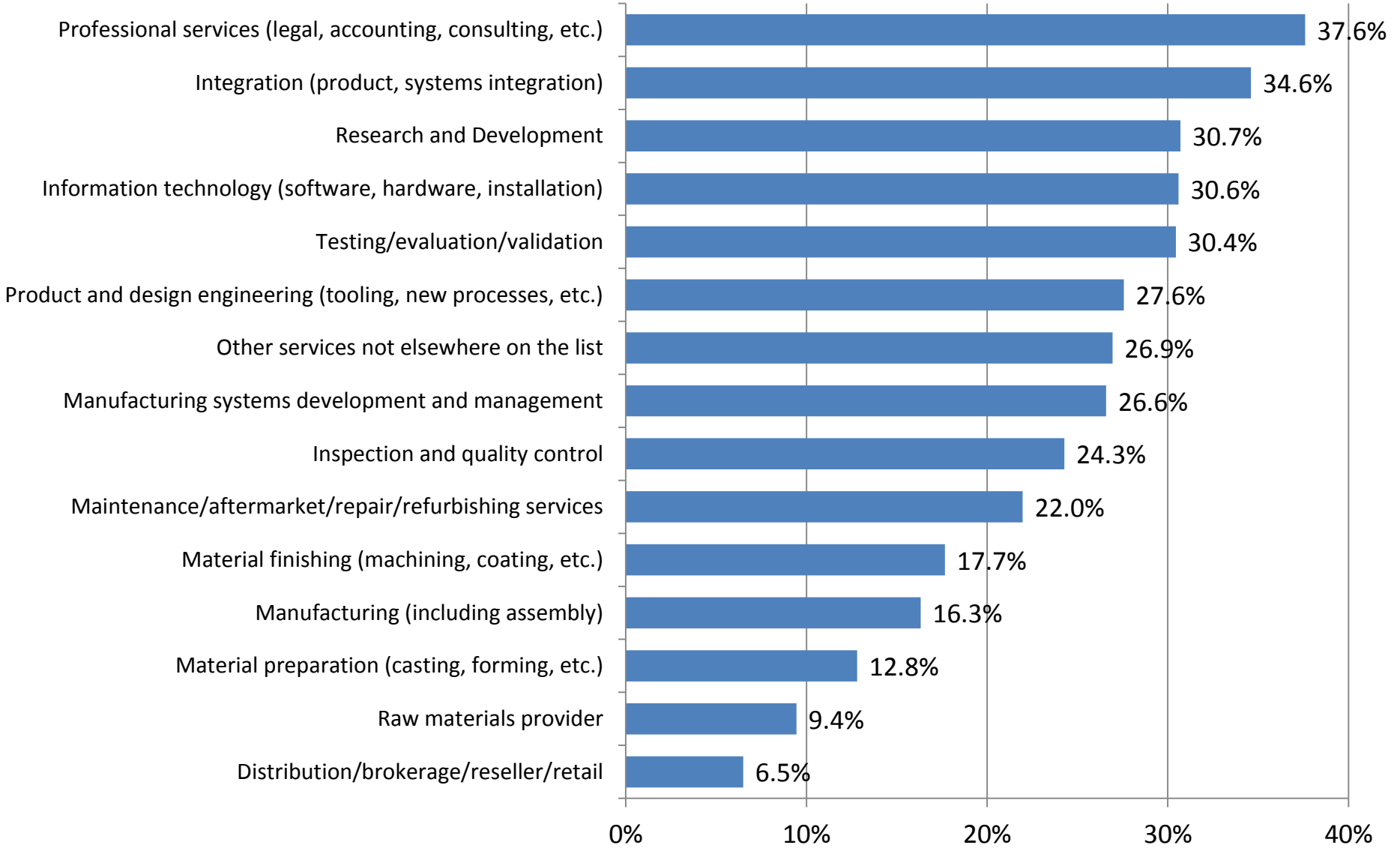
- "Current barriers include space-related products/services being under the State department (ITAR) rather than Commerce (EAR) and the requirement for validated EVM (which is inconsistent with federal cost-principles for educational institutions)." – University

- "Removing FAR and special quality clauses for low-volume or one-time sales. International Traffic in Arms Regulations limits ability of end-customers to receive technical support from entities in France." – Very large company

- "Modifications or development of special products for Government programs often results in many flowdowns like FAR, DFAR, ITAR that can dramatically increase admin costs." – Small company

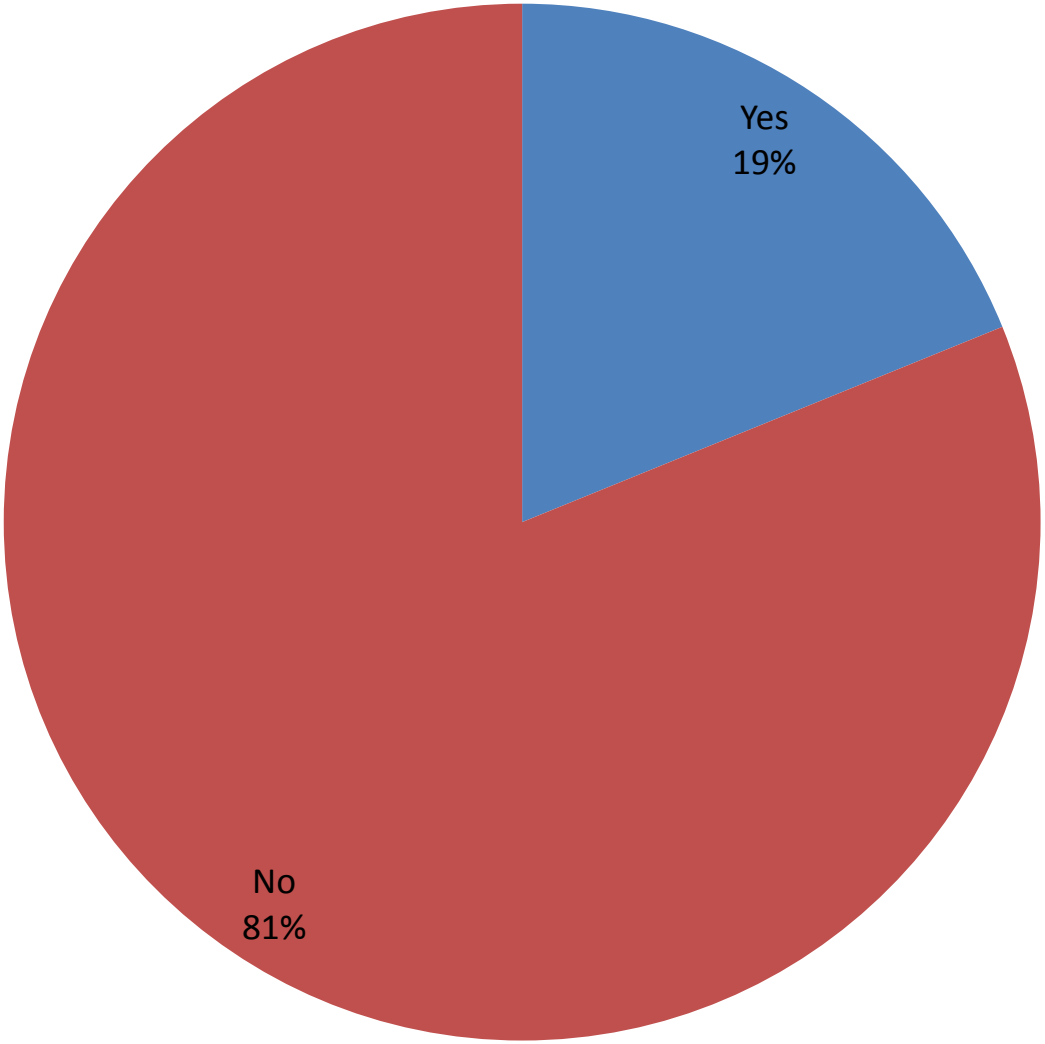
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Percent of Respondents Dependent on USG Space-Related Programs by Primary or Additional Business Line



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Self-Identified Dependency on USG Space Programs



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Dependency on USG Space Programs

- "Government programs historically provide cutting edge technology opportunities that develop skills, tools, high level technical talent. These programs support the continued evolution of high technology products." – Large company

- "University-based space science is almost entirely assistance/procurement funded and requires government programs to be viable." – University

- "In our field of research, i.e., cryogenics and cryocoolers, we highly depend on Government space-related programs. Commercial markets for our type of services and products are very limited. Future commercial space programs that include exploration may apply our technologies." – Very small company

- "Our business base is diverse enough that we would not become unviable if our space-related programs were to end or decrease. We would, however, suffer substantial harm to our business as space-related programs make up more than 50% of our business. We would certainly experience significant personnel lay-offs." – Large company

- "Our organization is aligned to core and high priority space programs to minimize our exposure to cancellation of current space related programs. In the event of a cancellation a program we support it is highly likely that most of our talented staff would find work in other less priority programs. However, I would expect our business base to be less stable and thus our viability as a corporation would degrade. " – Very small company

- "Yes…we miss the Space Shuttle" – Very large company

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Dependency on USG Space Programs

- "Government space related technology development and product manufacturing have been a primary part of our business. We are actively working to reduce our dependency on the government, however the type of work we do is highly specialized and there are not many non-governmental customers for this specialized work. Commercial space is growing, but the path to making it a viable industry is very uneven and difficult to navigate." – Small company

- "The export laws are hindering our ability to compete overseas and therefore all space related revenues are coming from US Gov't space related programs. We are hopeful this will change dramatically in 2013." – Very small company

- "Companies such as ours which provide high level engineering support to NASA recruit staff and tailor hiring to provide the best possible mix of education, experience and expertise for a given NASA program. When an existing program is cut or its direction is greatly altered, it puts us in the position of trying to support the new or modified direction to the best of our ability while struggling to retain skilled staff, who may consider leaving us for a larger contractor. It is more difficult for a small contractor to retain skilled personnel in times of job/program uncertainty than it is for a large contractor, since larger companies are perceived to be more economically stable and able to weather a period of budget or program cuts without the threat of possibly closing their doors." – Small company

- "Our current expertise and past 20 years of experience has been focused on developing the technologies and capabilities to support spacecraft command and control capabilities for the Federal Government." – Small company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Dependency on USG Space Programs

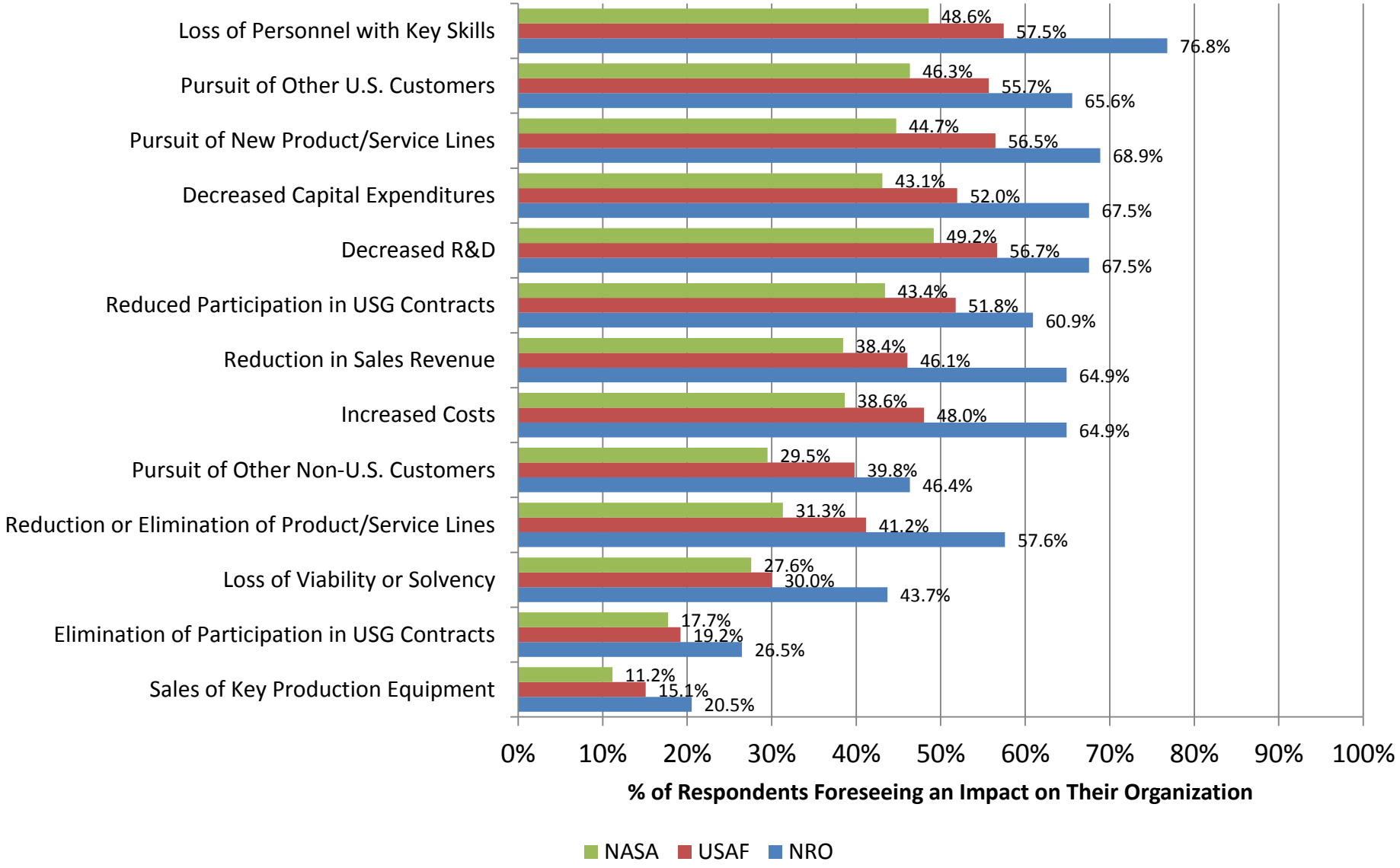
- "Universities are very diverse and receive funding for fundamental R&D for many different activities. Space-related funding is an incredibly important source of funding for this university and if it became unavailable it would have a significant negative impact but the university would most likely remain viable due to its diversification." – University

- "Many of the companies that we do business with would not exist without these programs" – Small company

- "[Company] derives the majority of its sales from commercial and international space programs. However, 100% of operations at our … facility are in support of US Government contracts. The viability of this facility is dependent on US Government programs. – Medium Company

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Potential Impacts of a Sudden Decrease in USG Space-Related Demand – Respondents Providing Space-Related Support



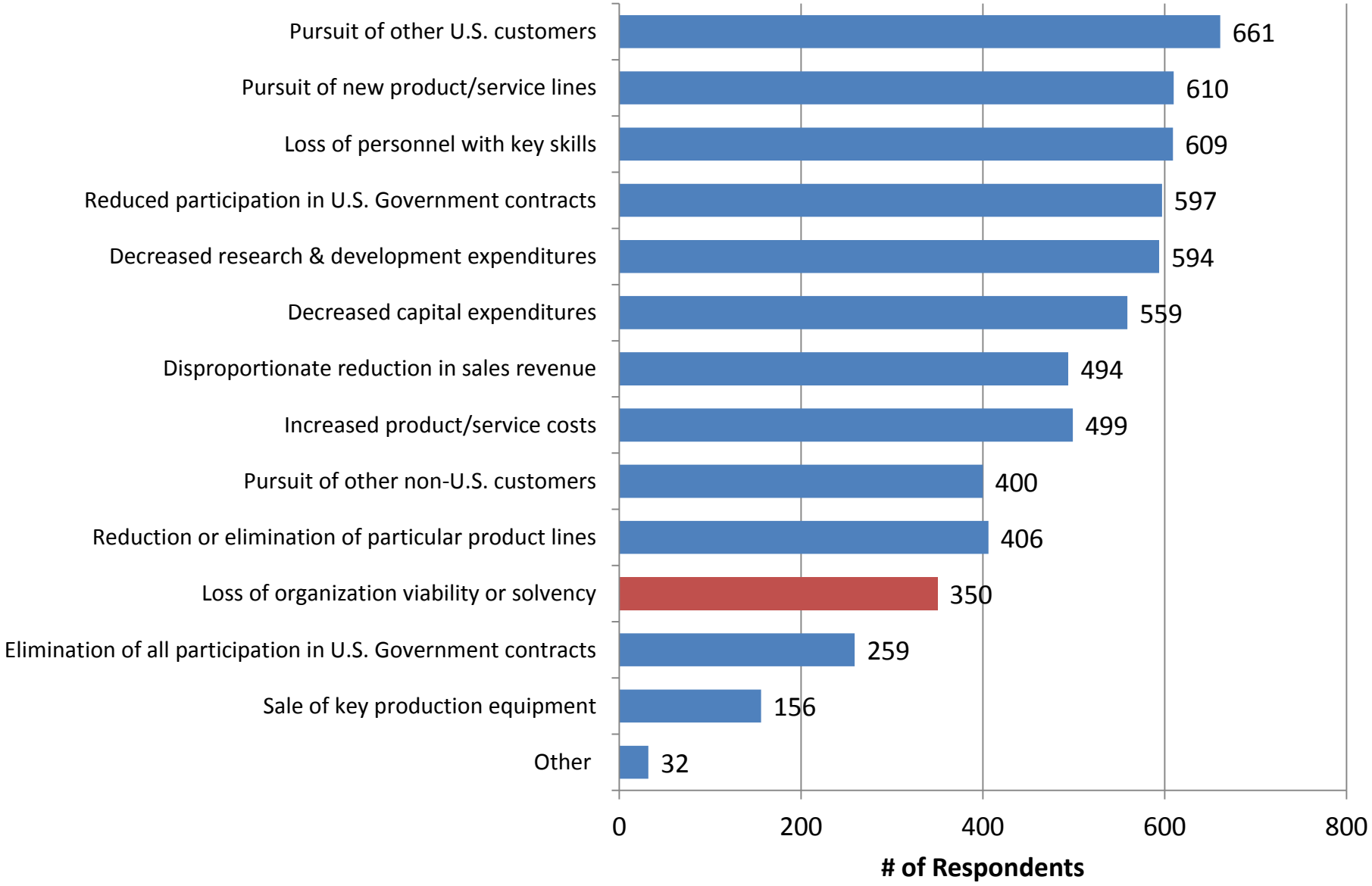
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

USG Agencies with the Respondents Expecting to be Most Impacted by a Sudden Decrease in USG Space-Related Demand

Most Impacted Among Respondents Providing Space-Related Support:	Most Impacted Among Respondents Providing Non-Space-Related Support:
1. NRO	1. MDA
2. DDRE	2. DDRE
3. NGA	3. NGA
4. NSA	4. NRO
5. DARPA	5. FAA
6. MDA	6. DARPA
7. NOAA	7. DOE
8. CIA	8. NSA
9. U.S. Air Force	9. U.S. Navy
10. U.S. Navy	10. U.S. Army

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Potential Impacts of a Sudden Decrease in USG Space-Related Demand



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Continued Desire to Work With the USG

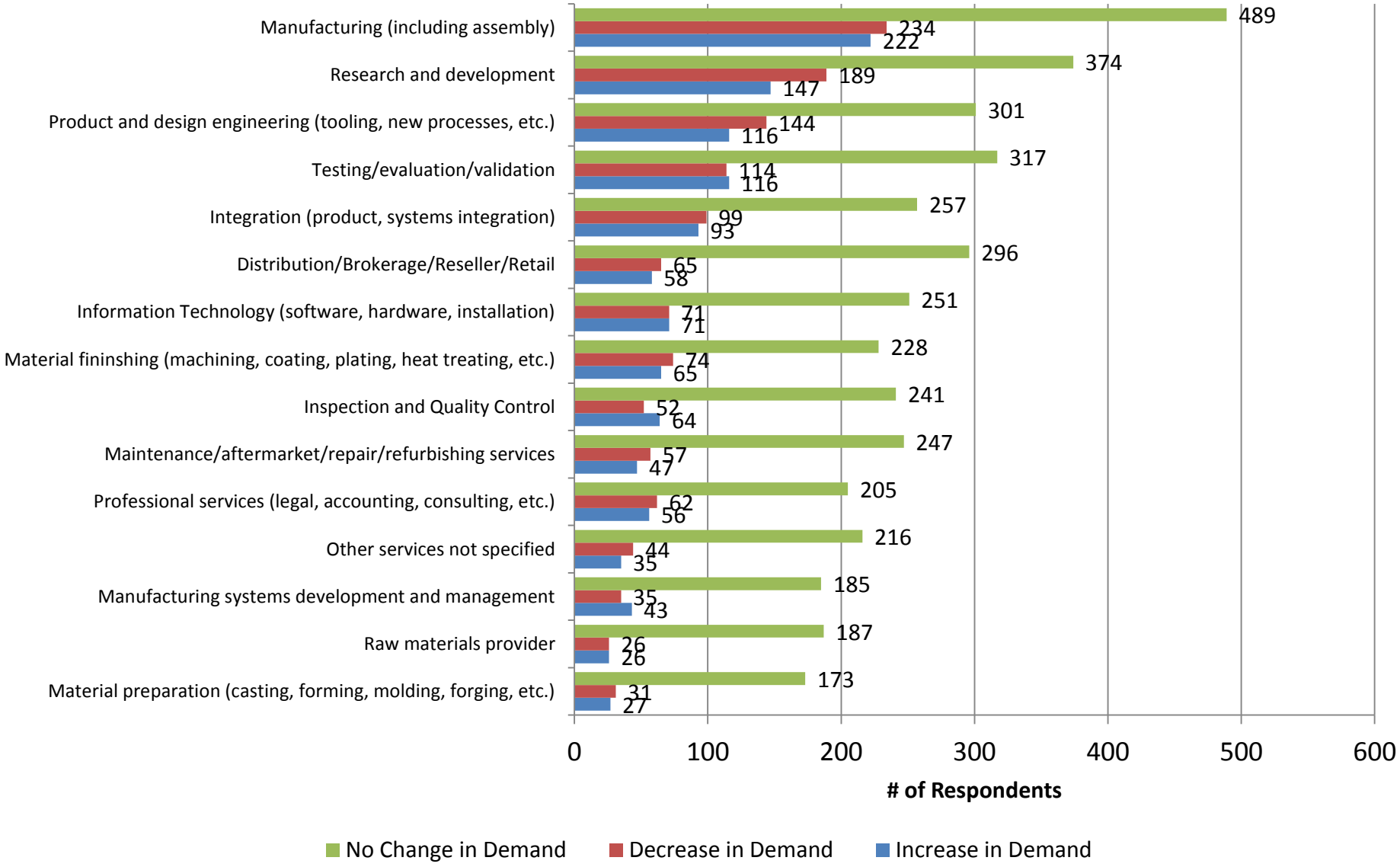
19 percent (376 of 2,022) of respondents said that variability in demand from the USG for space-related products and services have somewhat or significantly adversely impacted their desire to serve these customers.

Adverse Impacts:

- "Variation in year-to-year R&D budgets over the last 2 - 3 years due to changes in program priorities, federal budget pressures, cancellation of key programs has had a significant negative impact on our business stability over those years. Hiring and other long range investments have been strongly affected" – Very small company.
- "The decrease in USG space programs has fundamentally changed the outlook for several of our clients and just as importantly it has significantly impacted several potential clients resulting in a drastically reduced demand for services we provide. Consequently, while we are still interested in this segment, the market outlook is much more somber than it was just 2-3 years ago" – Very small company.
- "Desire unchanged, just fewer opportunities" – Very small company.
- "This is the work we do and we love it. We do it by choice. We are very dependent on the US government, but we couldn't do the same work in any other context. So we just keep doing it, even if it's not always stable. A lot of great talent is leaving the industry because of this, though. The massive NASA layoffs of last year are a sad example of that" – Very small company.
- "We invested approximately one man-year plus tens of thousands of dollars to develop a product for our customer only for them to buy only three units. Due to the customer's lack of business, we have effectively cancelled the product" – Large company.
- "In the past we could make an investment in technology development targeting future or current space NASA space programs and get a reasonable return on that investment. Now such investments do not provide a return because NASA is either changing direction or all the money is being diverted internally" – Small company.

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Change in Space-Related Customer Demand for Respondents' Business Lines (2009-2012)

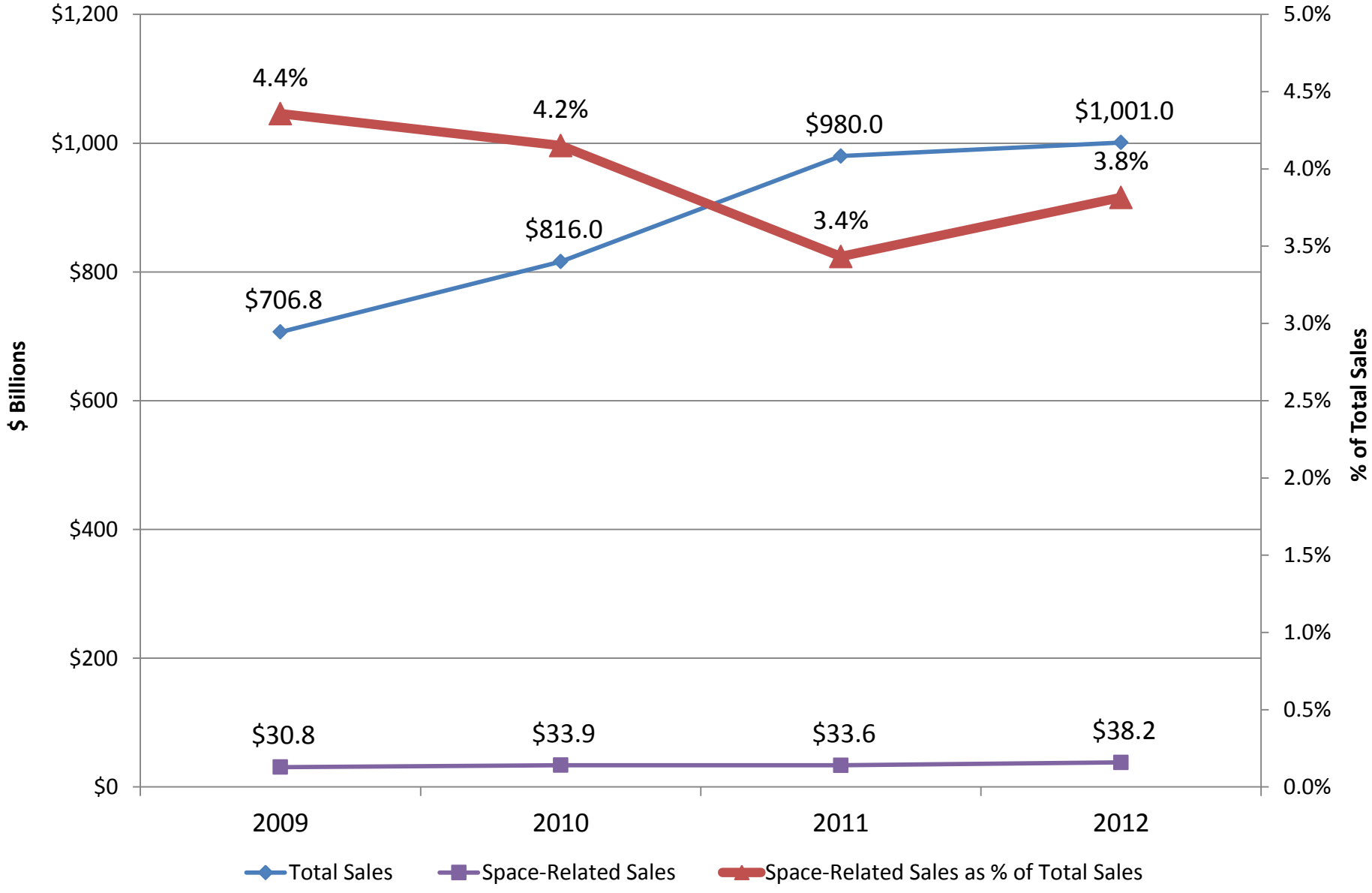


Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Net Change in Space-Related Customer Demand for Respondents' Business Lines (2009-2012)

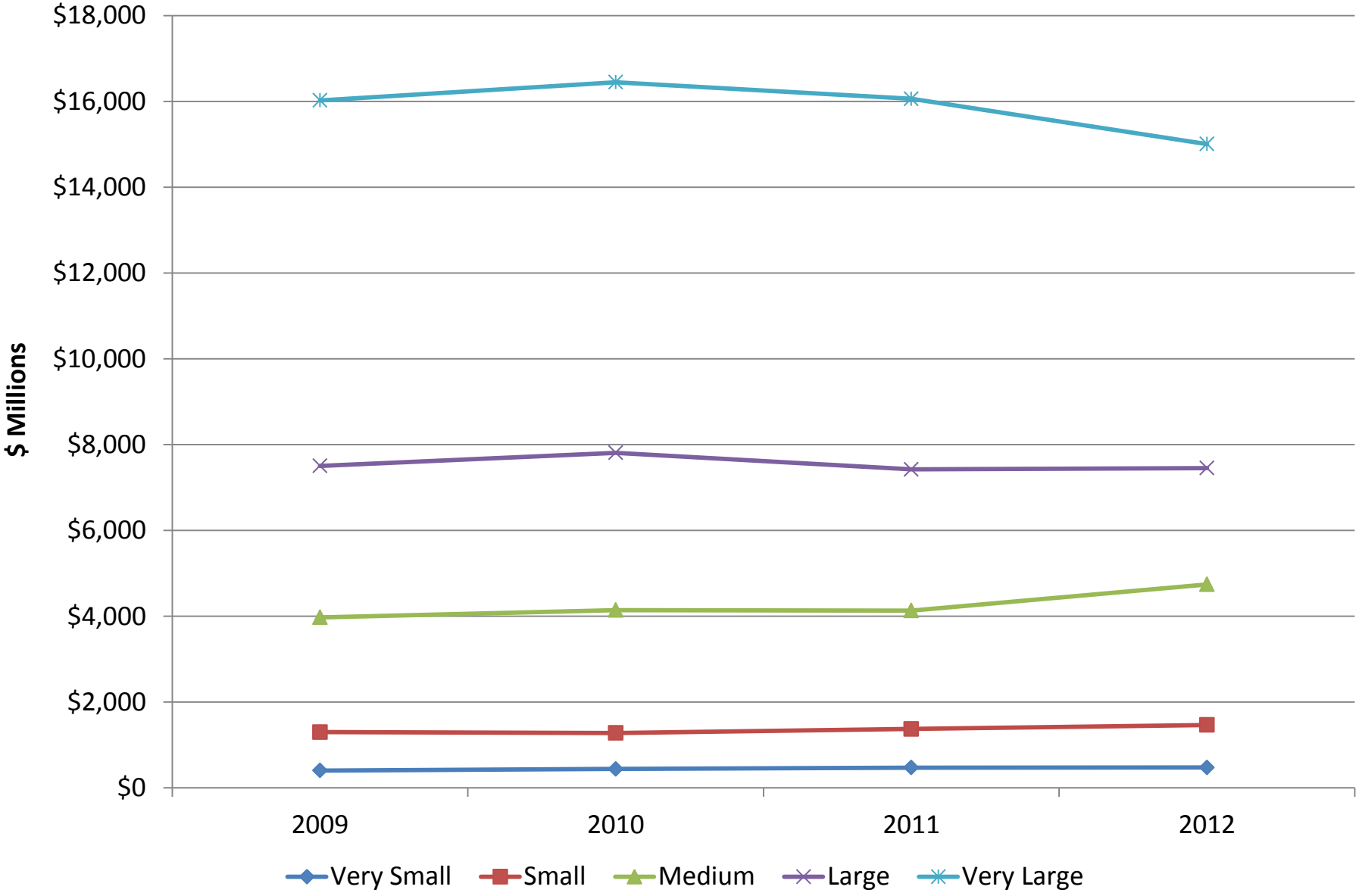
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Total Sales vs. Space-Related Sales (2009-2012)



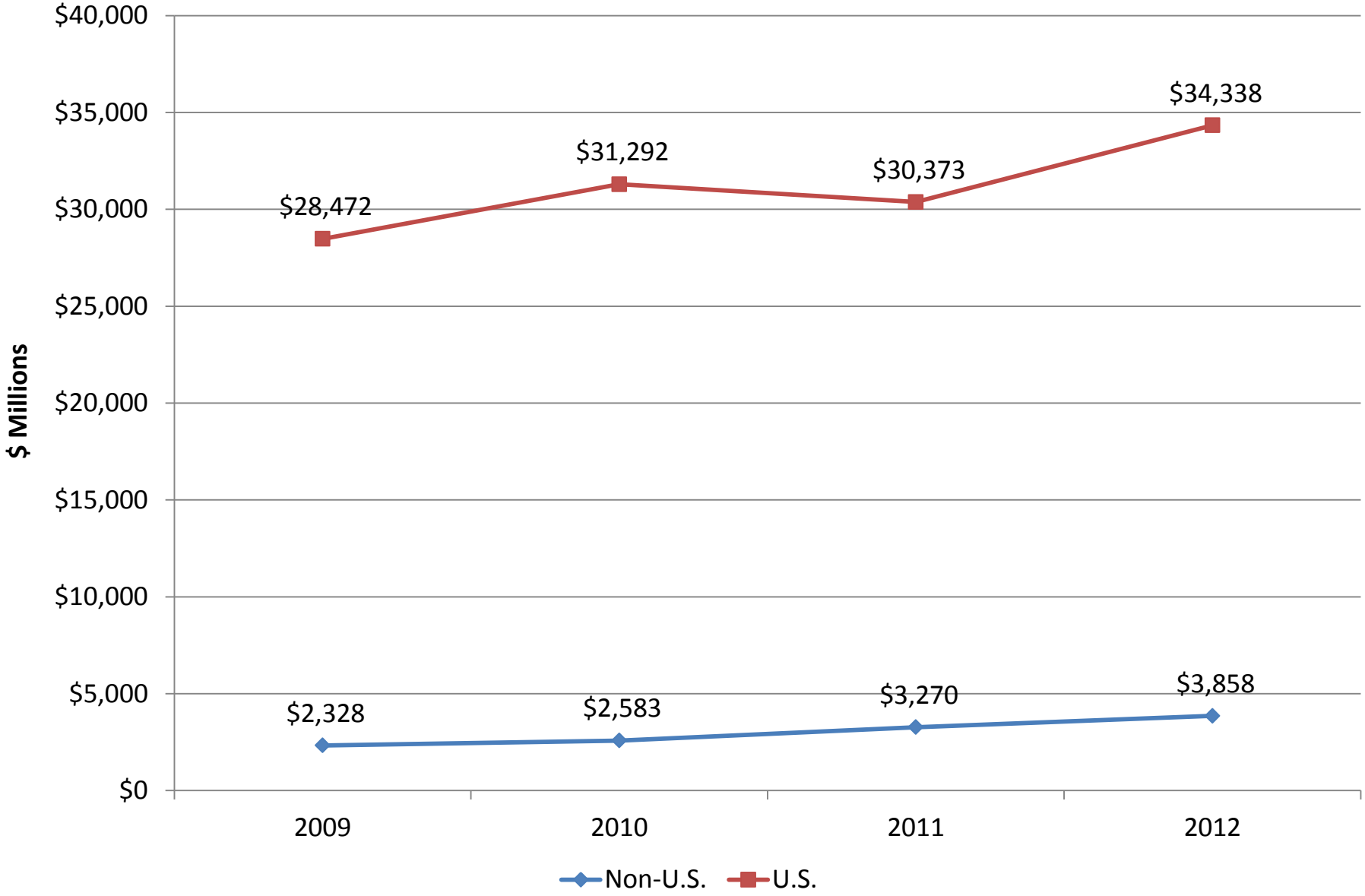
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Total Space-Related Sales by Respondent Size (2009-2012)



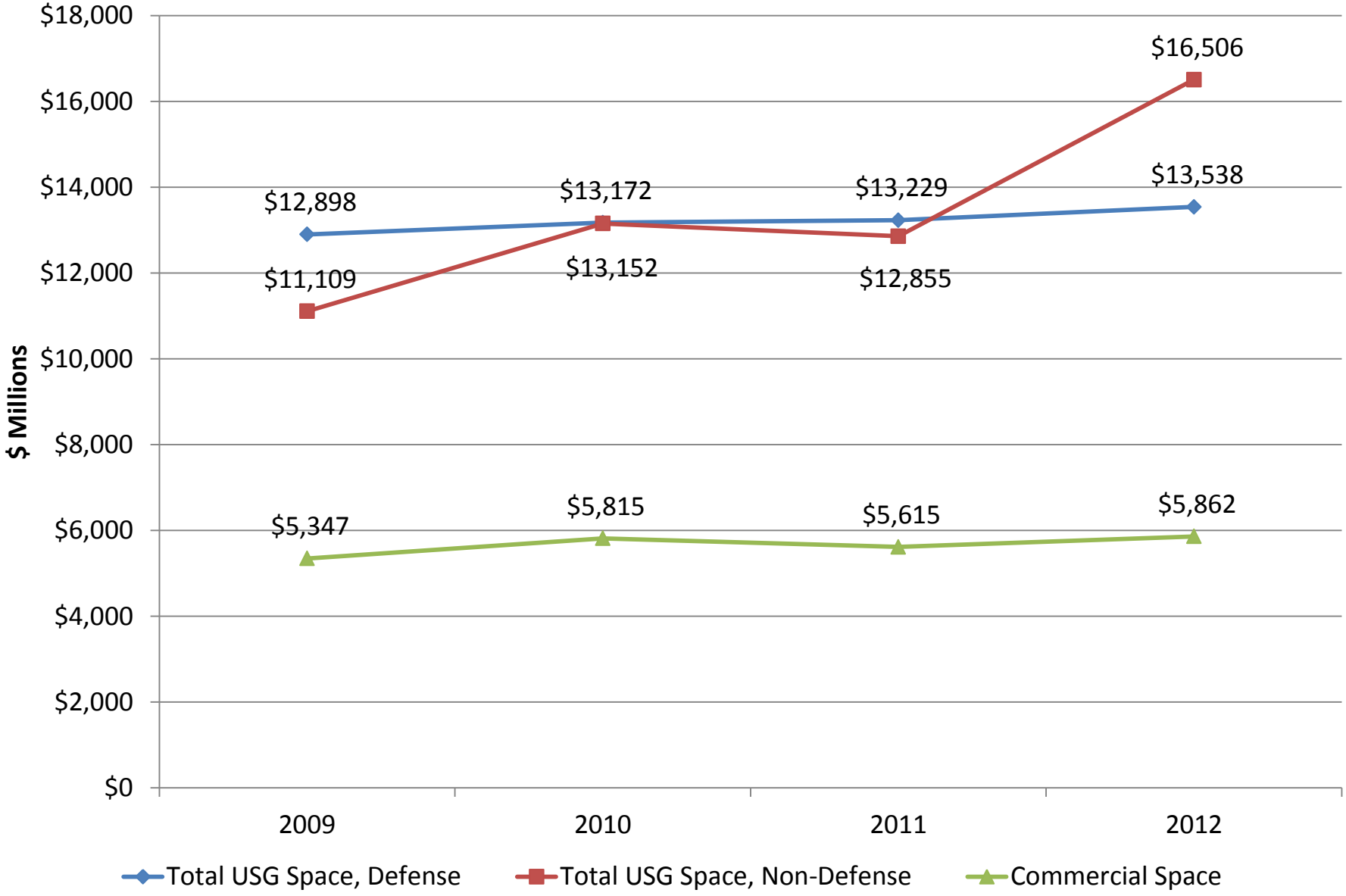
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Total Space-Related Sales by Location (2009-2012)



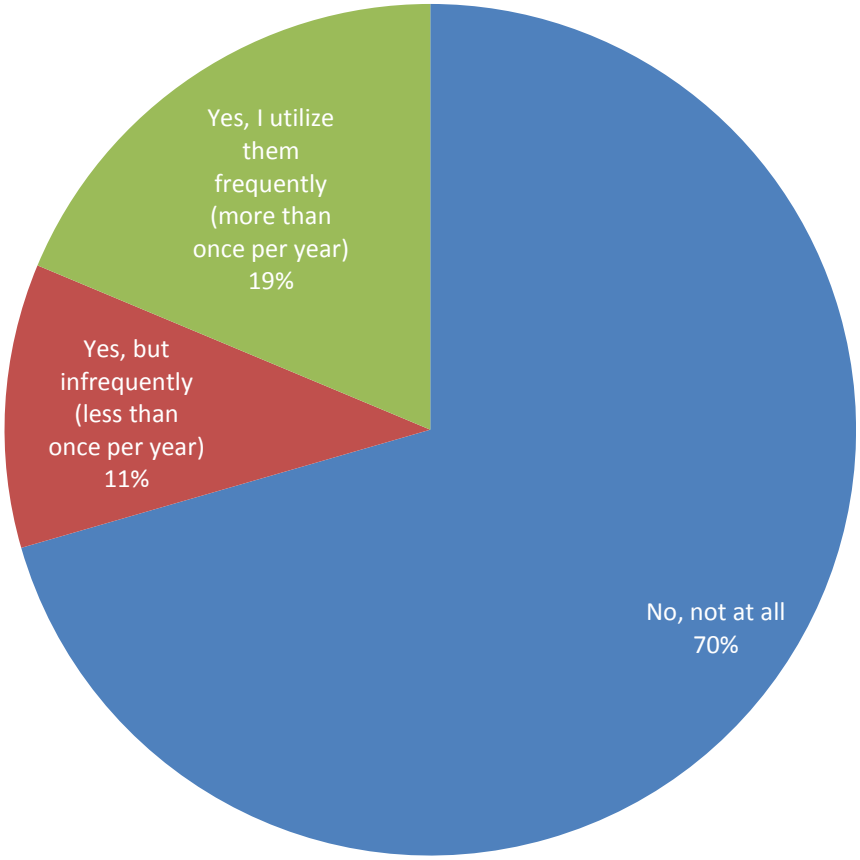
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Total Space-Related Sales by Customer (2009-2012)



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

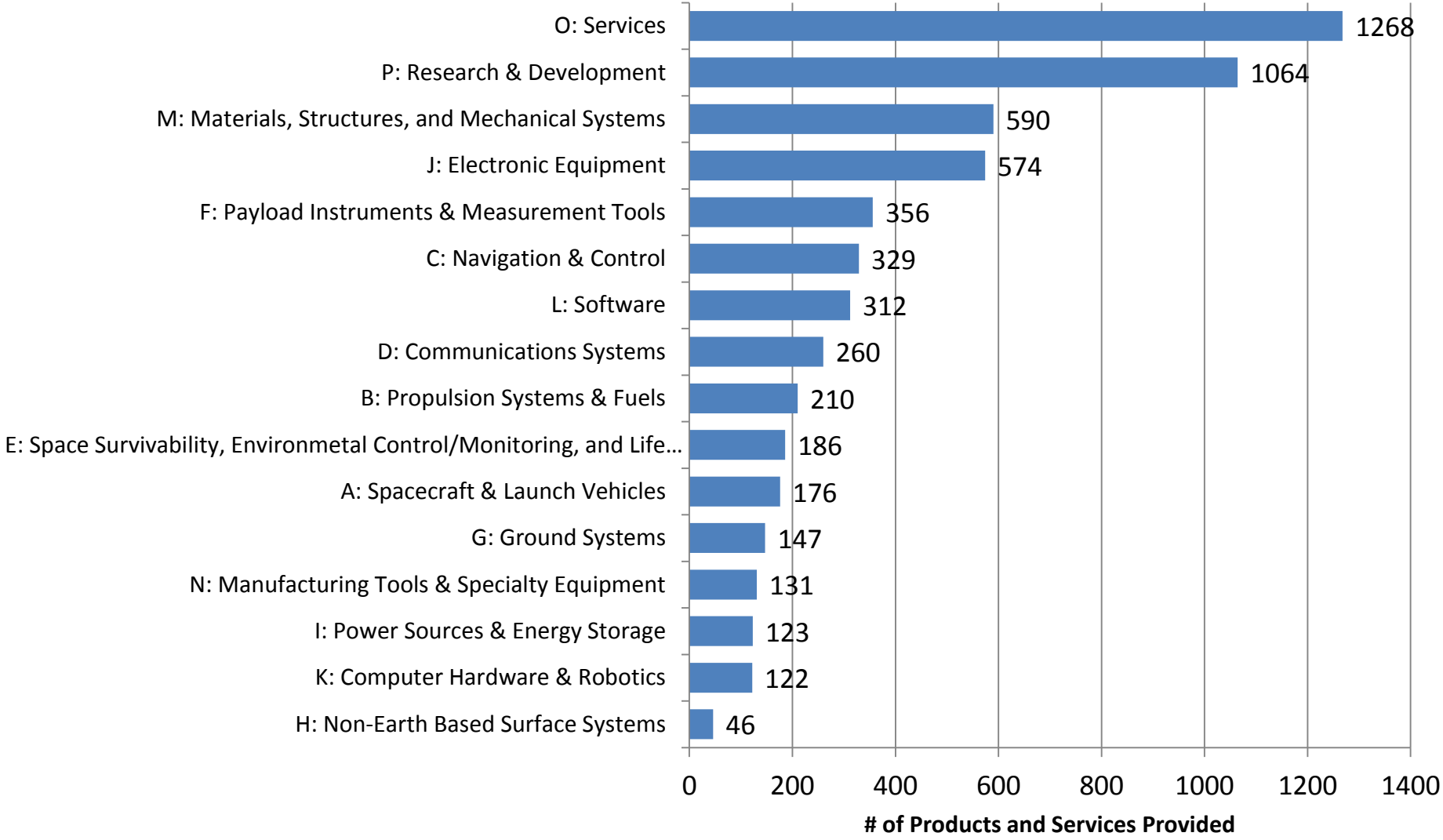
Utilization of U.S. Export Control System (ITAR/EAR) for Space-Related Products/Services



Impacts of U.S. Export Regulations on Space-Related Products and Services	
Impact	**% of Respondents***
Avoided the export of space-related products or services subject to ITAR-related controls	27.2%
Incentivized non-U.S. organizations to "design-out" or avoid buying U.S. origin space-related products or services	25.0%
Incentivized non-U.S. organizations to offer "ITAR-free" space-related products or services	20.6%
Avoided the export of space-related products or services subject to EAR-related controls	16.6%
Contributed to the creation of non-U.S. companies/business lines in direct competition with the organization's space-related products or services	14.6%
Altered space-related R&D expenditures	10.6%
Caused the abandonment or alteration of space-related business lines	9.7%
Caused re-location of space-related production/R&D facilities outside the United States due to regulatory burdens	1.7%
* Based on 596 respondents that selected "Yes" to utilizing U.S. export controls for space-related products.	

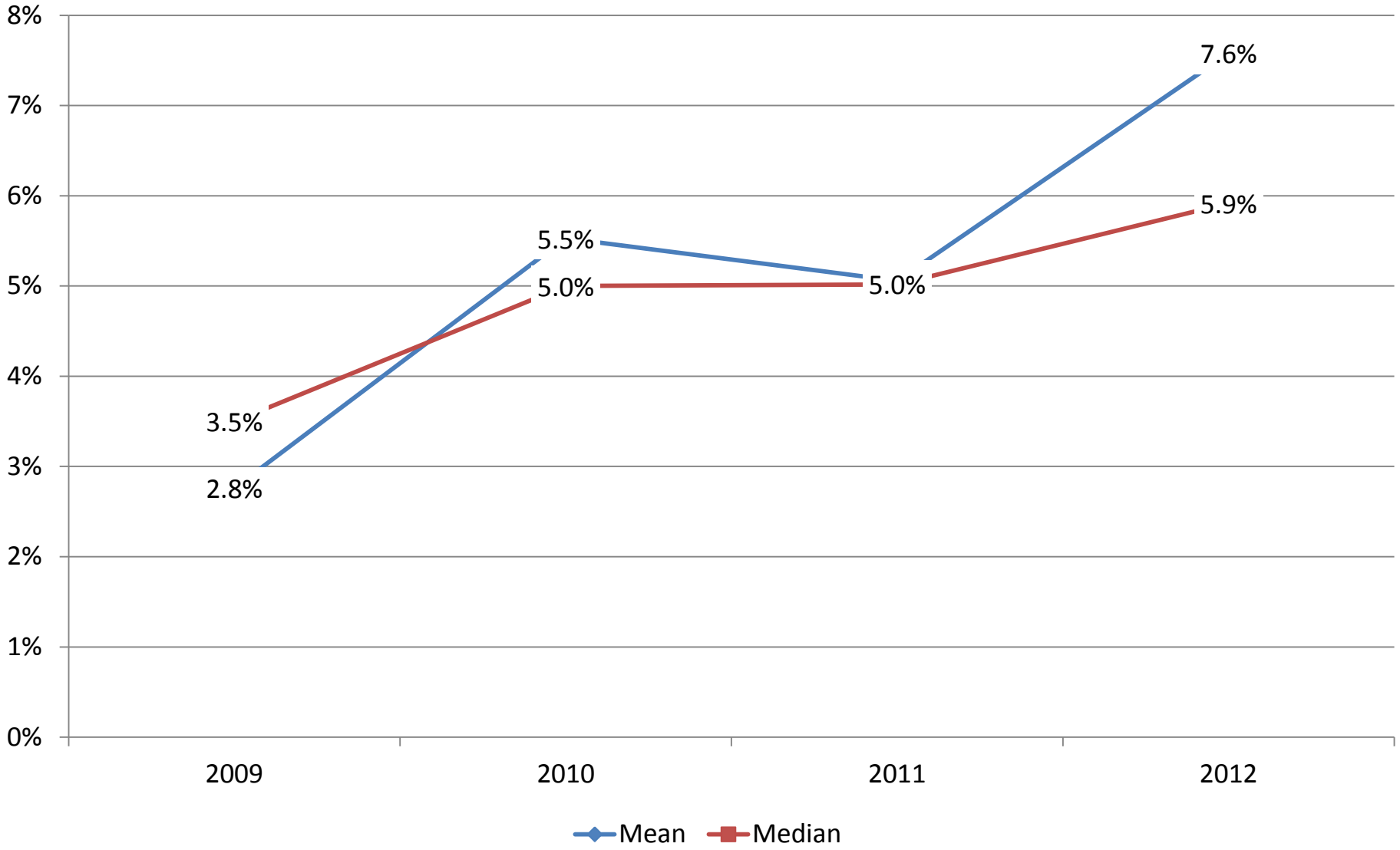
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Products and Services Provided by Respondents Utilizing U.S. Export Controls – by Segment



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

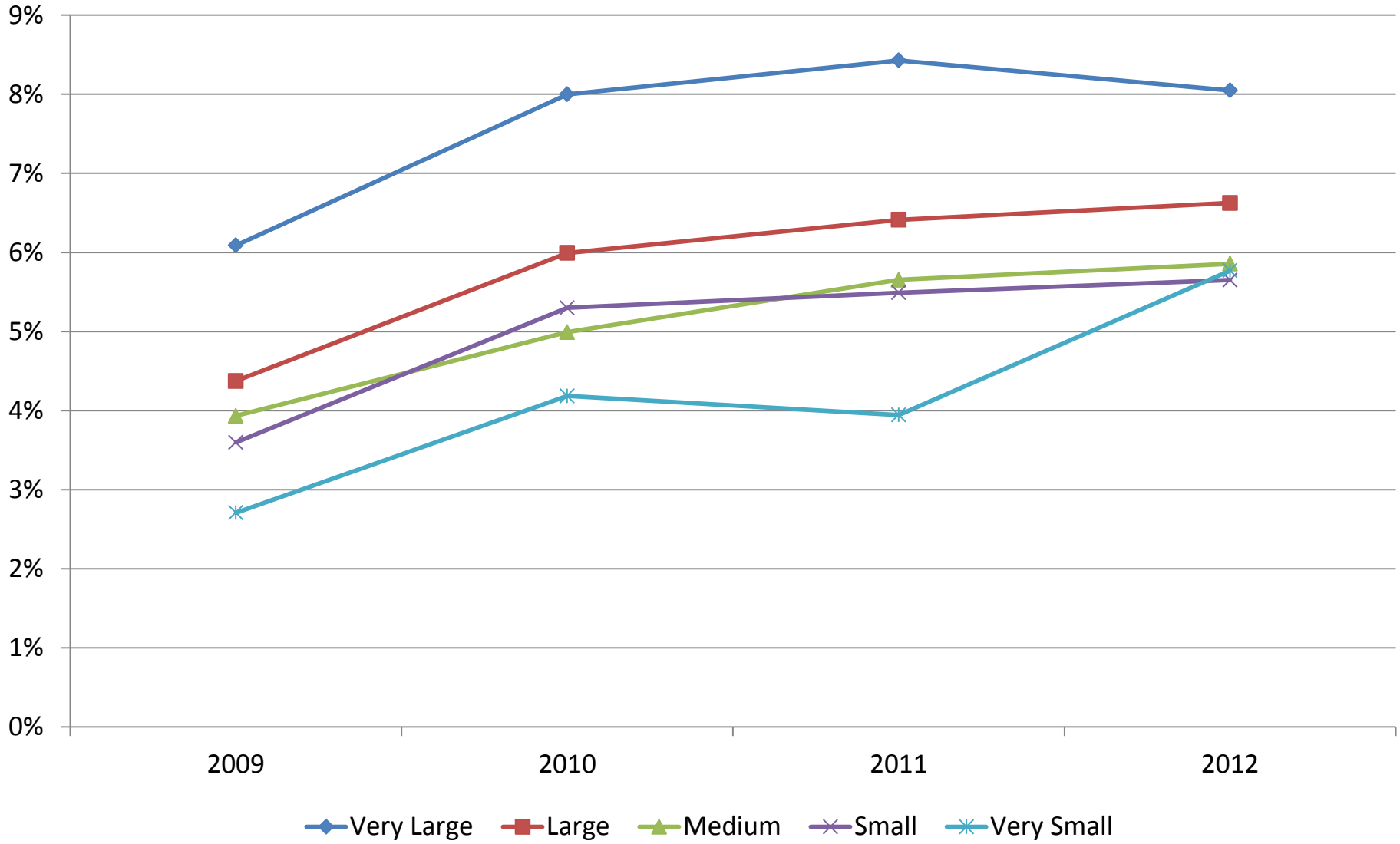
Respondents' Net Profit Margin (after tax)*



* Based on 1,838 responses

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

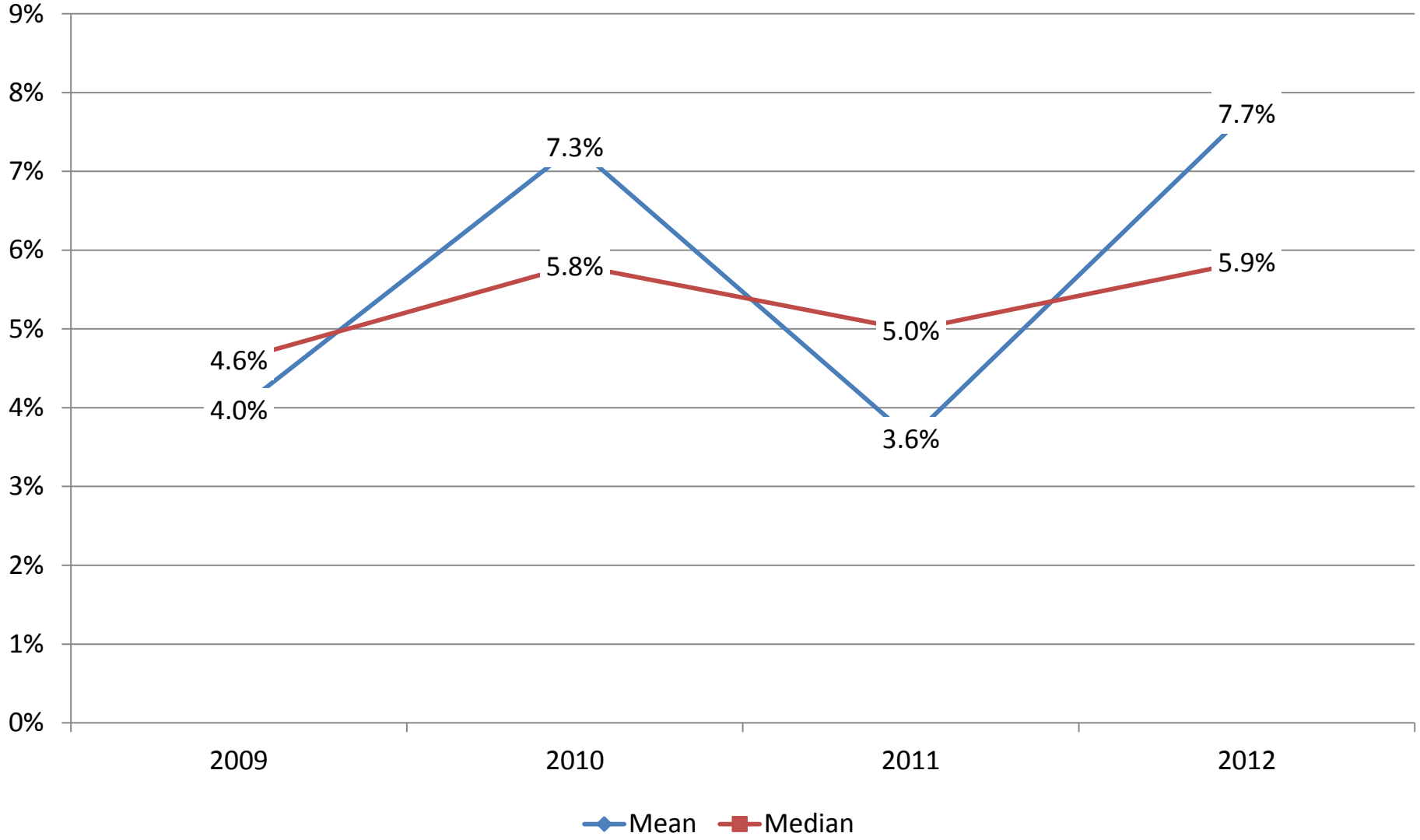
Respondents' Net Profit Margin (after tax)*
- Median of All Commercial Companies



* Based on 1,838 responses

Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

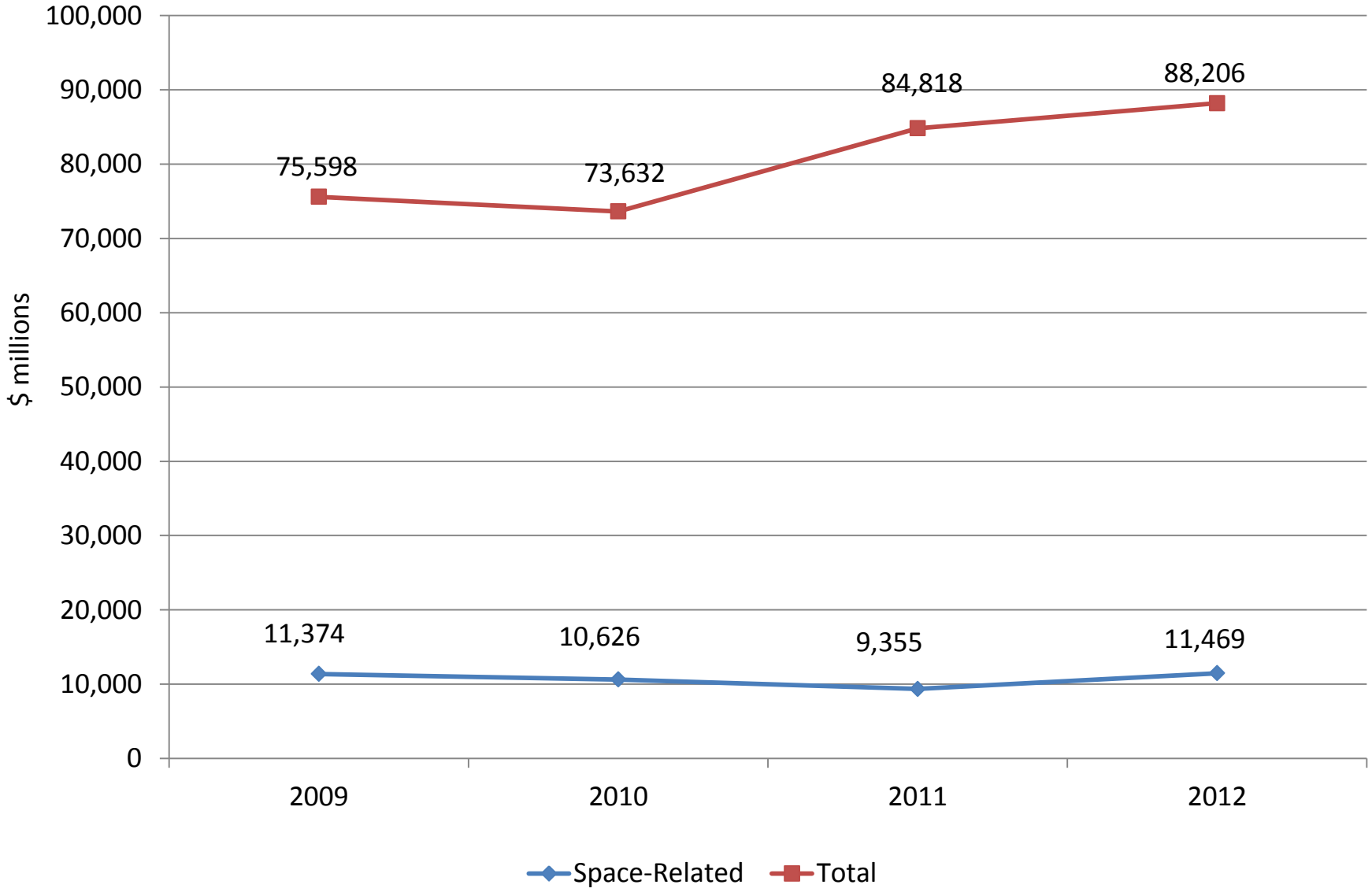
Respondents' Net Profit Margin (after tax) *
- Commercial Companies Dependent on USG Space Programs



* Based on 335 responses

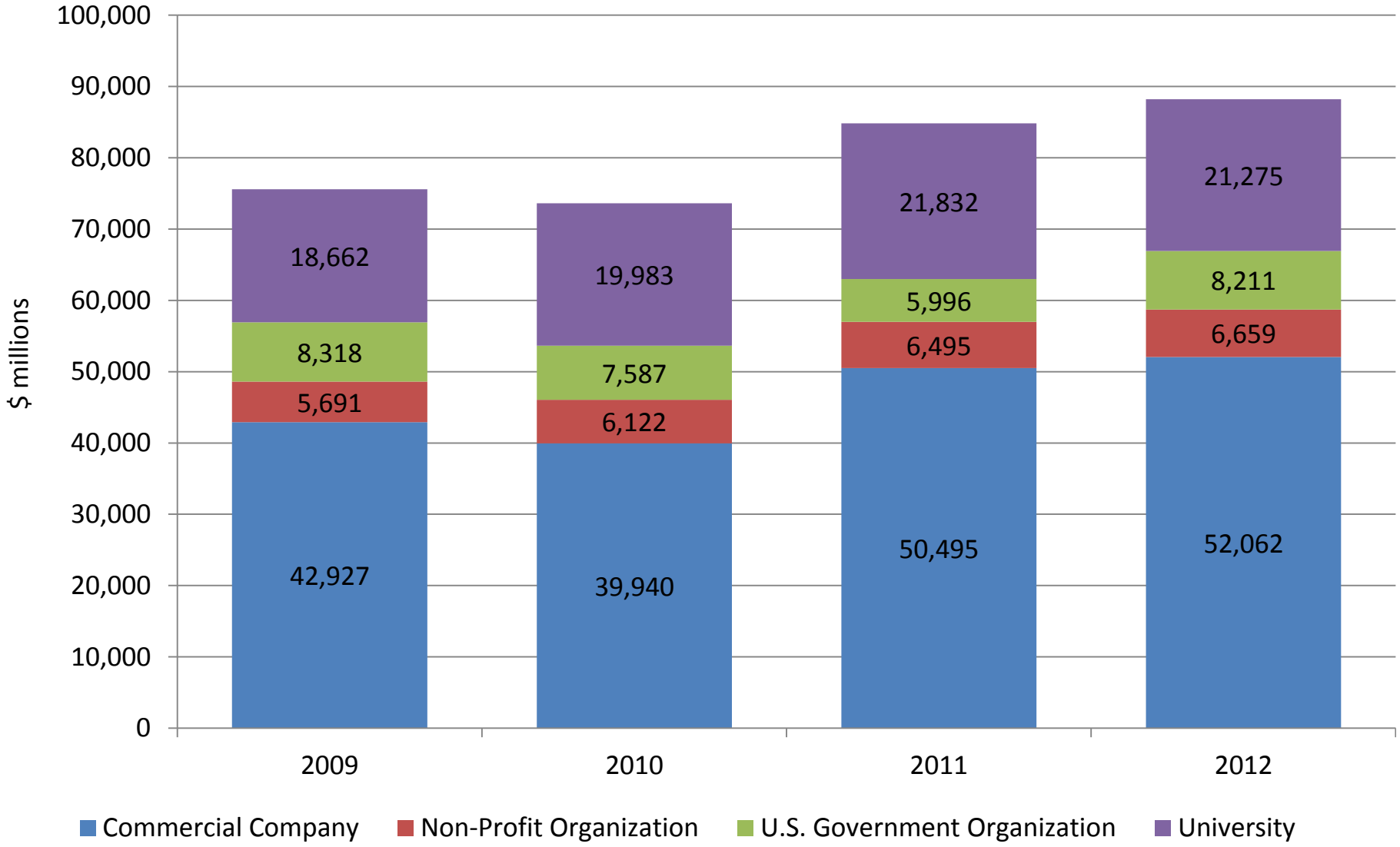
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Total Research and Development Expenditure 2009-2012



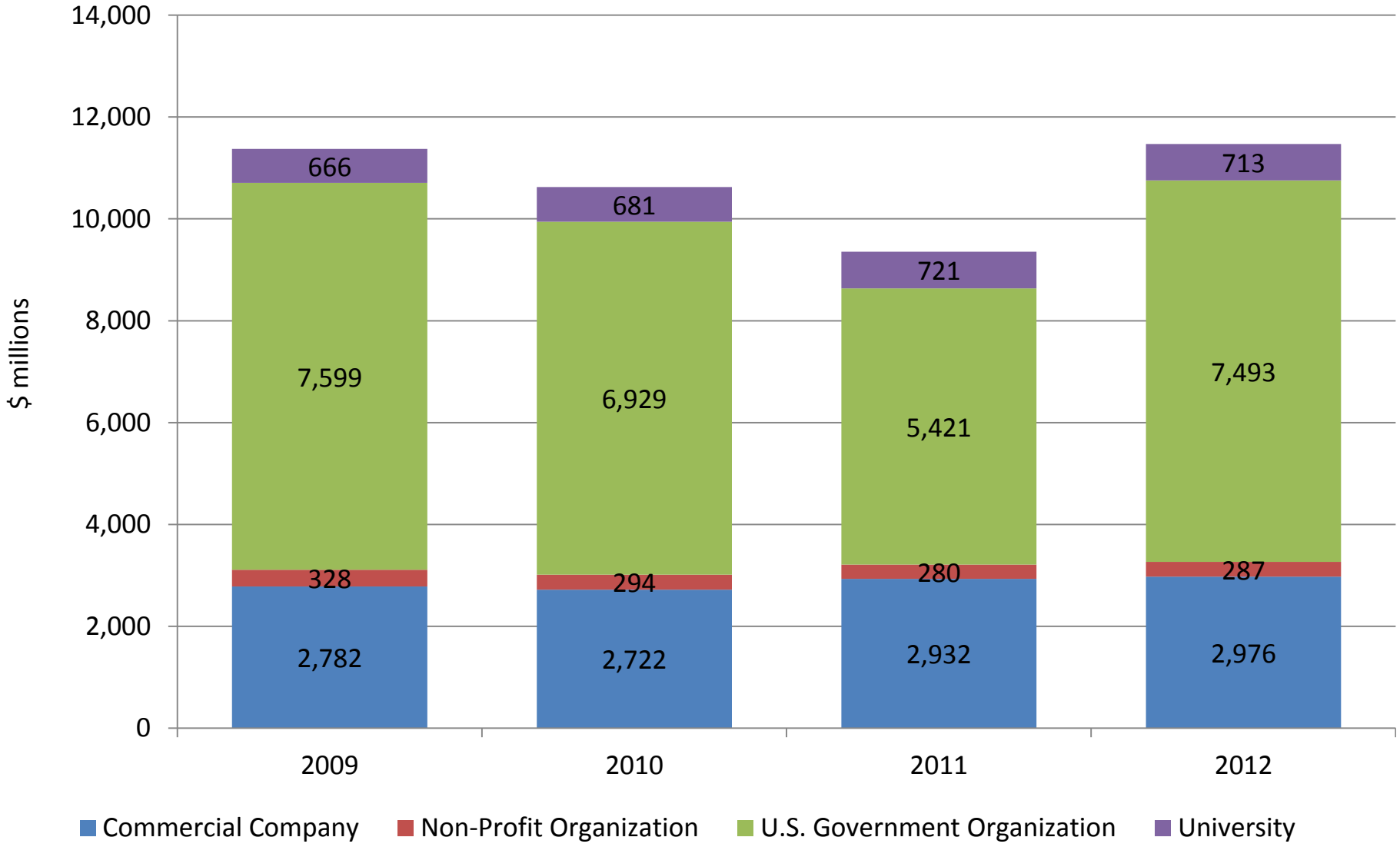
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Research and Development Expenditure by Respondent Type 2009-2012



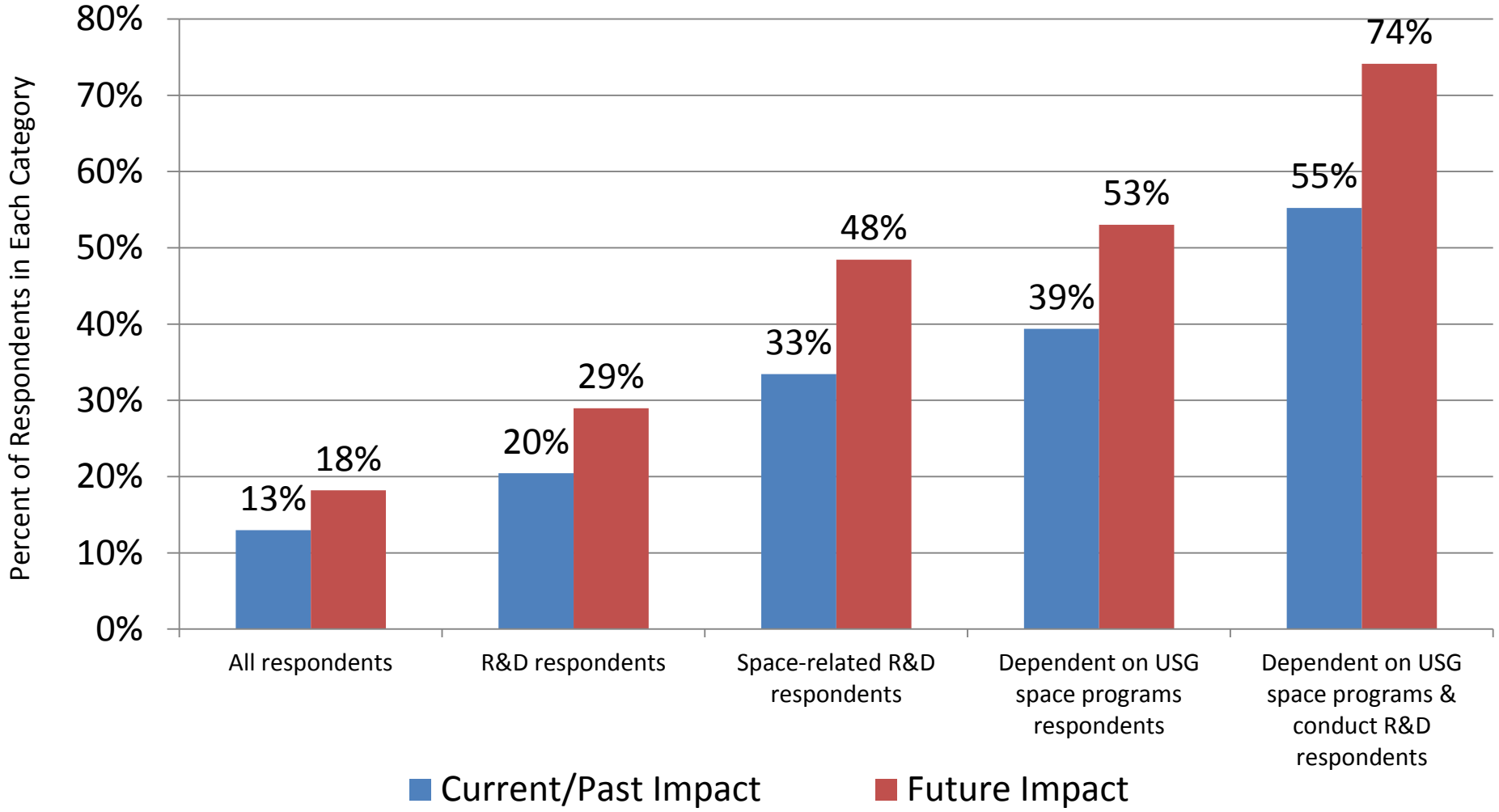
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Space-Related Research and Development Expenditure by Respondent Type 2009-2012



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Respondents Experiencing Moderate or Significant Adverse Impacts to R&D Due to Reductions in USG Space-Related Spending



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Adverse Impacts on R&D Due to Reductions in USG Space-Related Spending

- "If space related spending is reduced, this will have an adverse affect. However, if budgets are reduced in certain government agencies (e.g. NASA) and applied instead to more efficient private sector companies, there will be little disruption and many benefits" – Very small company.

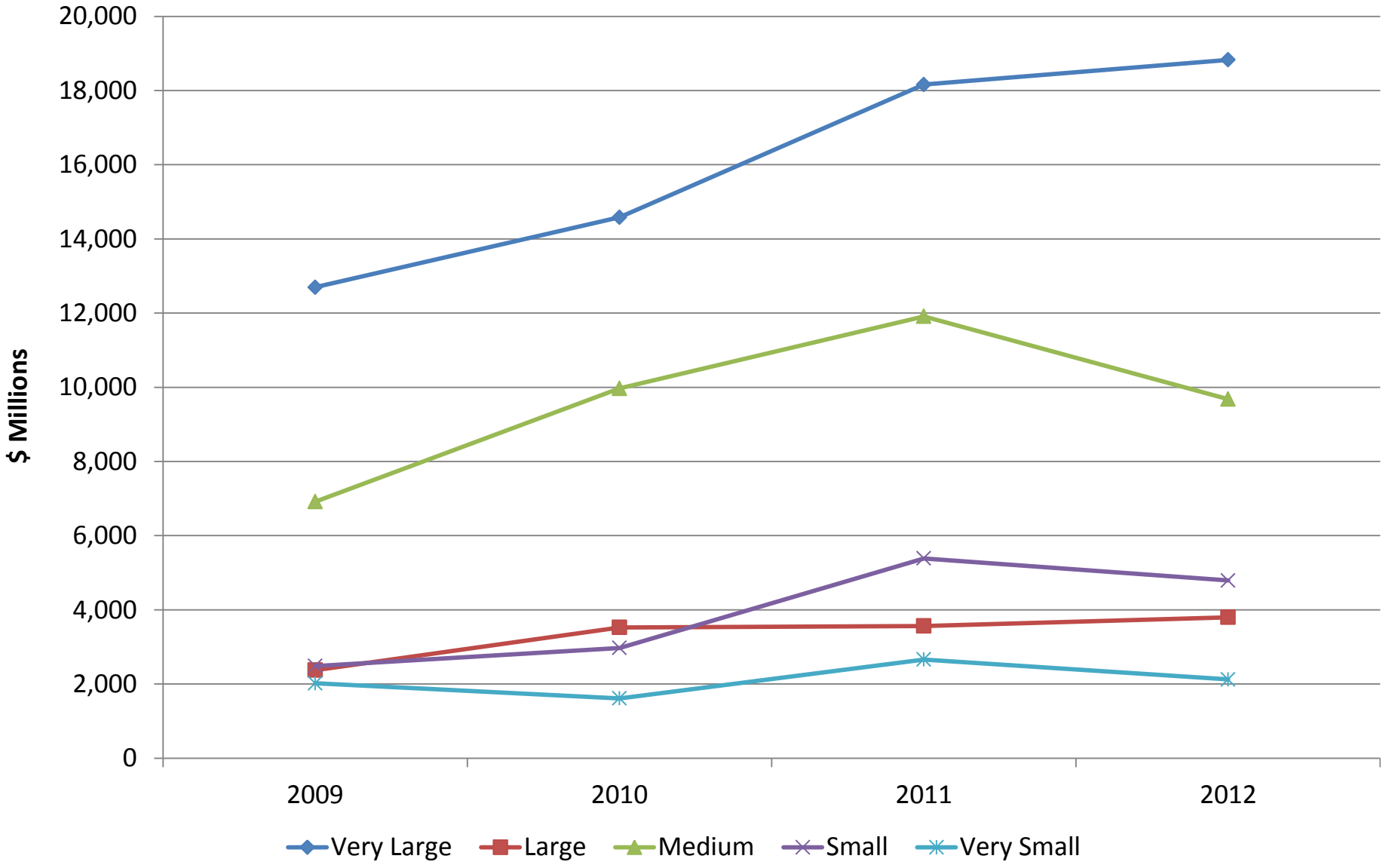
- "Our faculty and students interested in pursuing advanced degrees and careers in planetary - and/or space-related science must gain hands-on experience working with authentic NASA and/or mission-related data. A reduction in funding for these programs will adversely affect the potential for our faculty and students to access and gain experience in the field" – University.

- "Reduction in NASA human spaceflight (MPCV and SLS) contracts has effectively eliminated internal Research and Development activities" – Very large company.

- "Reduction in R&D spending for space related projects reduced the opportunity for leading edge technologies like nano-tech materials to be developed, tested and adopted elsewhere in the economy. Much of today's standard technology was birthed in the early space programs of NASA" – Very small company.

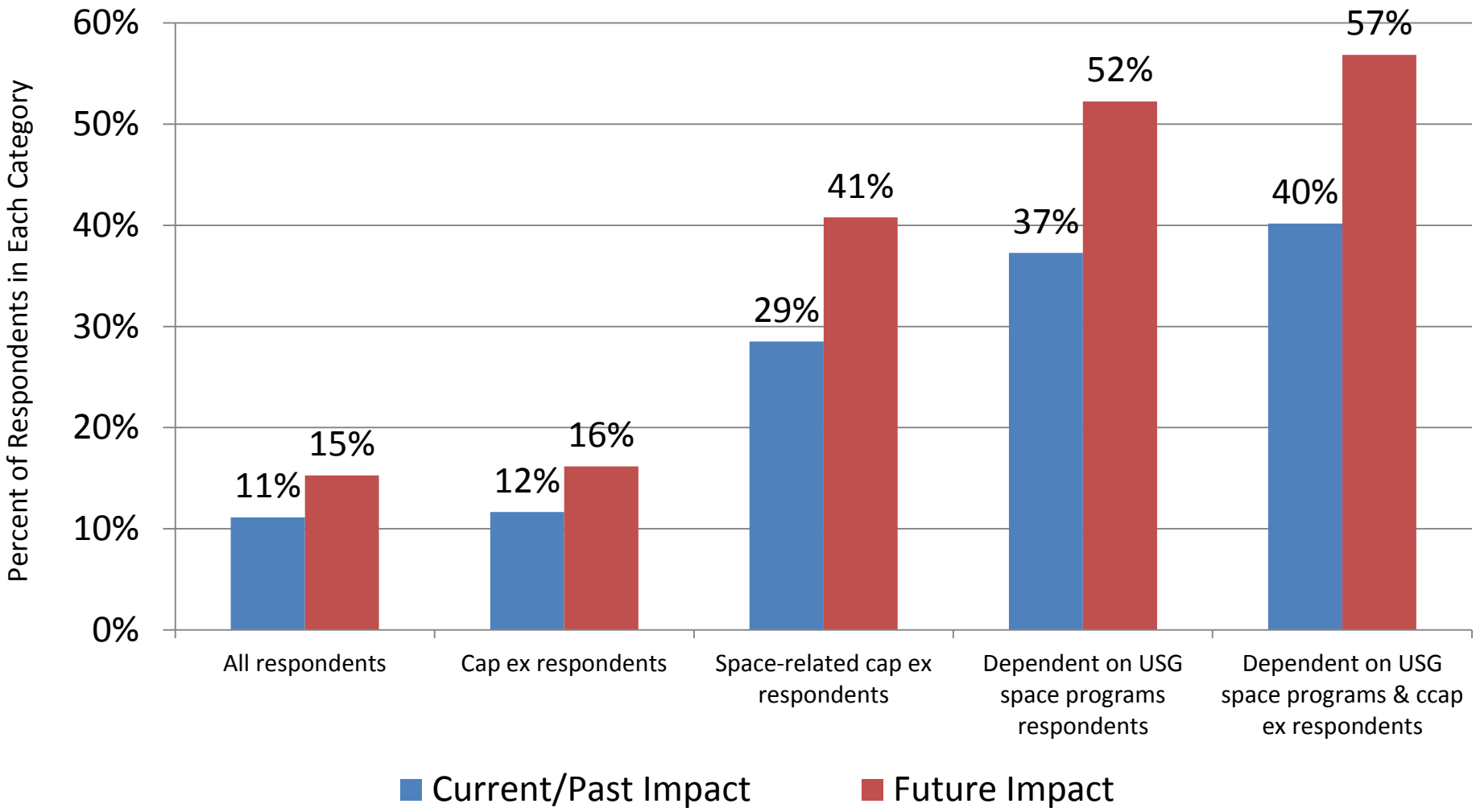
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Commercial Companies' Capital Expenditures by Size



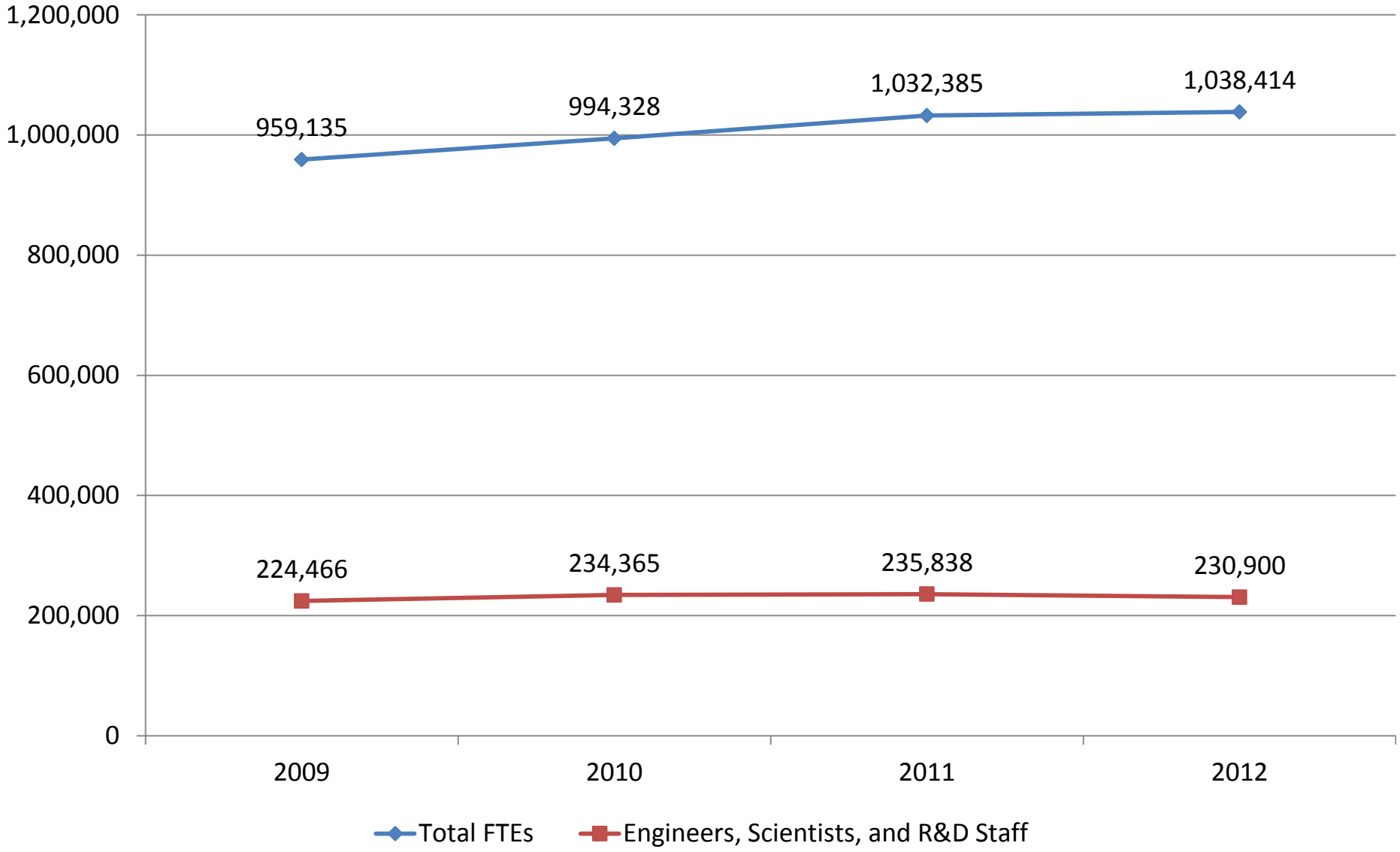
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Respondents Experiencing Moderate or Significant Adverse Impacts to Capital Expenditures Due to Reductions in USG Space-Related Spending



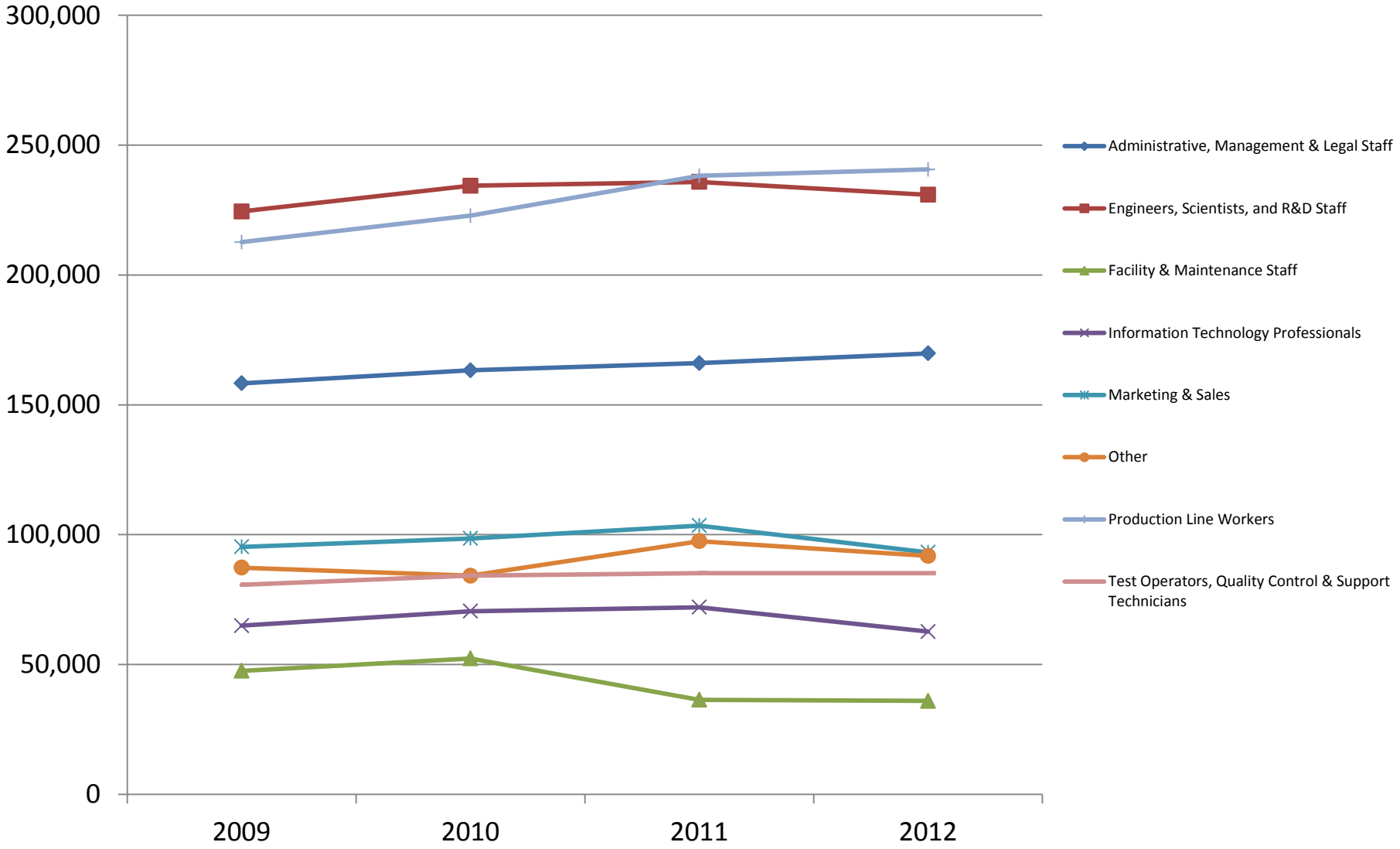
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Full Time Employees by Type (Excluding Universities)



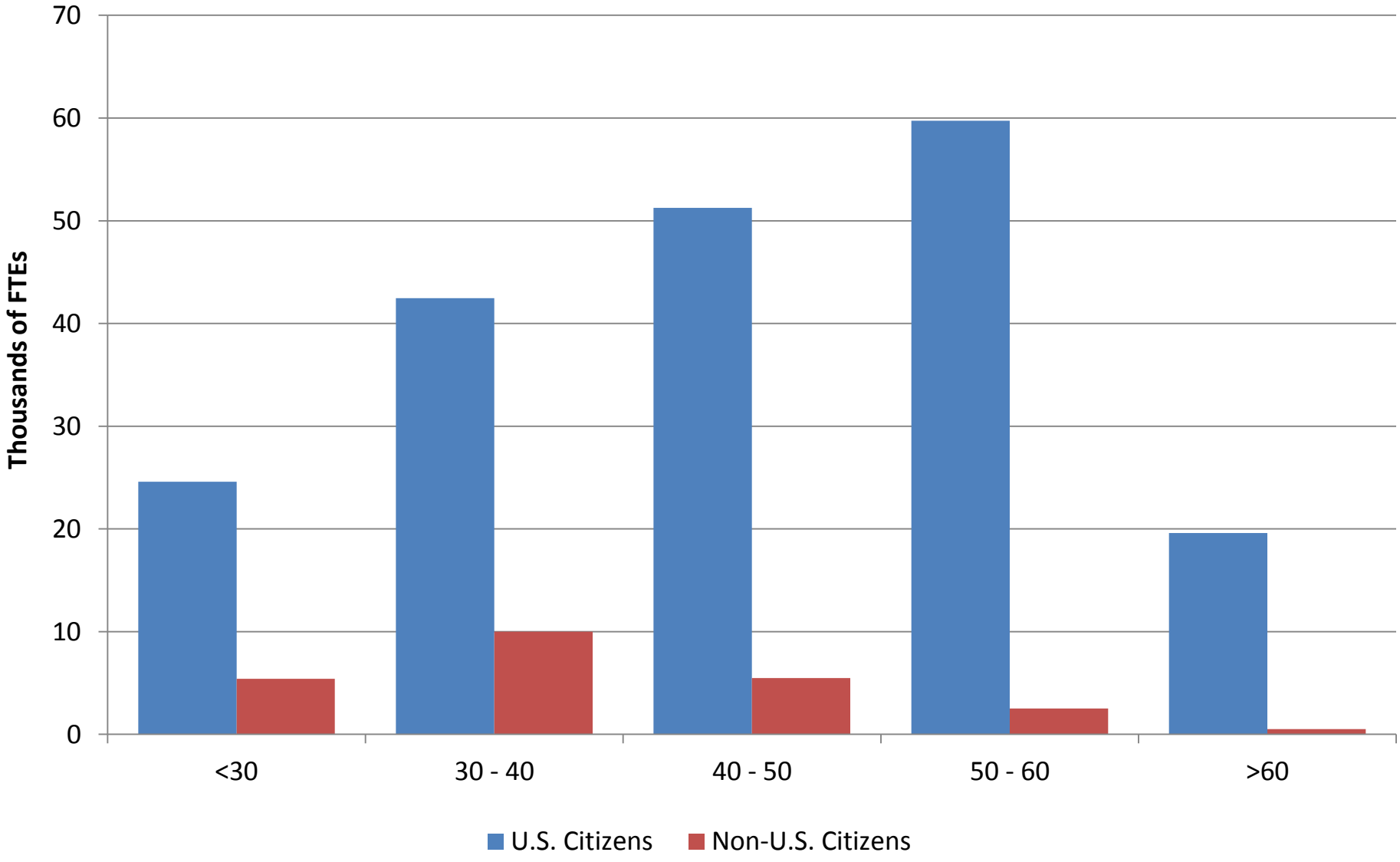
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Full Time Employees by Type (Excluding Universities)



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Age Range of Engineers, Scientists, and R&D Staff*



* Excluding universities

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

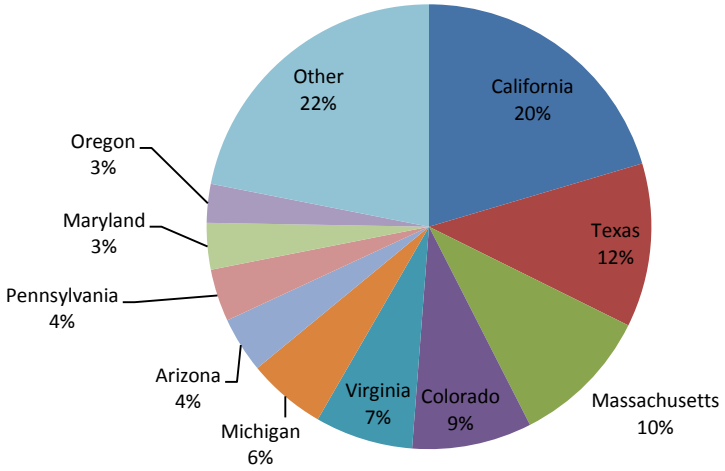
Unfilled Vacancies for Skill Positions

- We asked respondents to identify how many **unfilled vacancies** they currently have for the following positions:
  - Engineers, Scientists, and R&D Staff
  - Production Line Workers
  - Testing Operators, Quality Control, & Support Technicians

- 716 respondents (35 percent) **currently have 14,891 vacancies** for these positions.

Vacancies by Organization Size/Type	
Very Small	751
Small	878
Medium	2,701
Large	2,310
Very Large	5,469
No Sales	638
Universities	2,144

Vacancies by State (Excluding Universities)



Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 10 Issues and Challenges Affecting Respondents' Long-Term Viability
Domestic Competition
Proposed Cuts to U.S. Government Space Programs
Labor Costs
Foreign Competition
Variability of Demand
Government Acquisition Process
Healthcare
Skills Retention
Government Regulatory Burden
Taxes
* Based on a weighted score.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Respondents Interested in Available USG Assistance Programs and Services

Program	# of Respondents
Business development	387
R&D programs	305
SBIR and STTR contracts	252
Global export opportunities	240
Manufacturing technology development	221
Export licensing (ITAR/EAR)	221
Training Opportunities	206
Financing	184
Marketing assessment skills	174
Product/service development	164
Government procurement guidelines and e-commerce	166
Patents and trademarks	113
Energy and environmentally conscious manufacturing	109
Country Commercial Guides	38

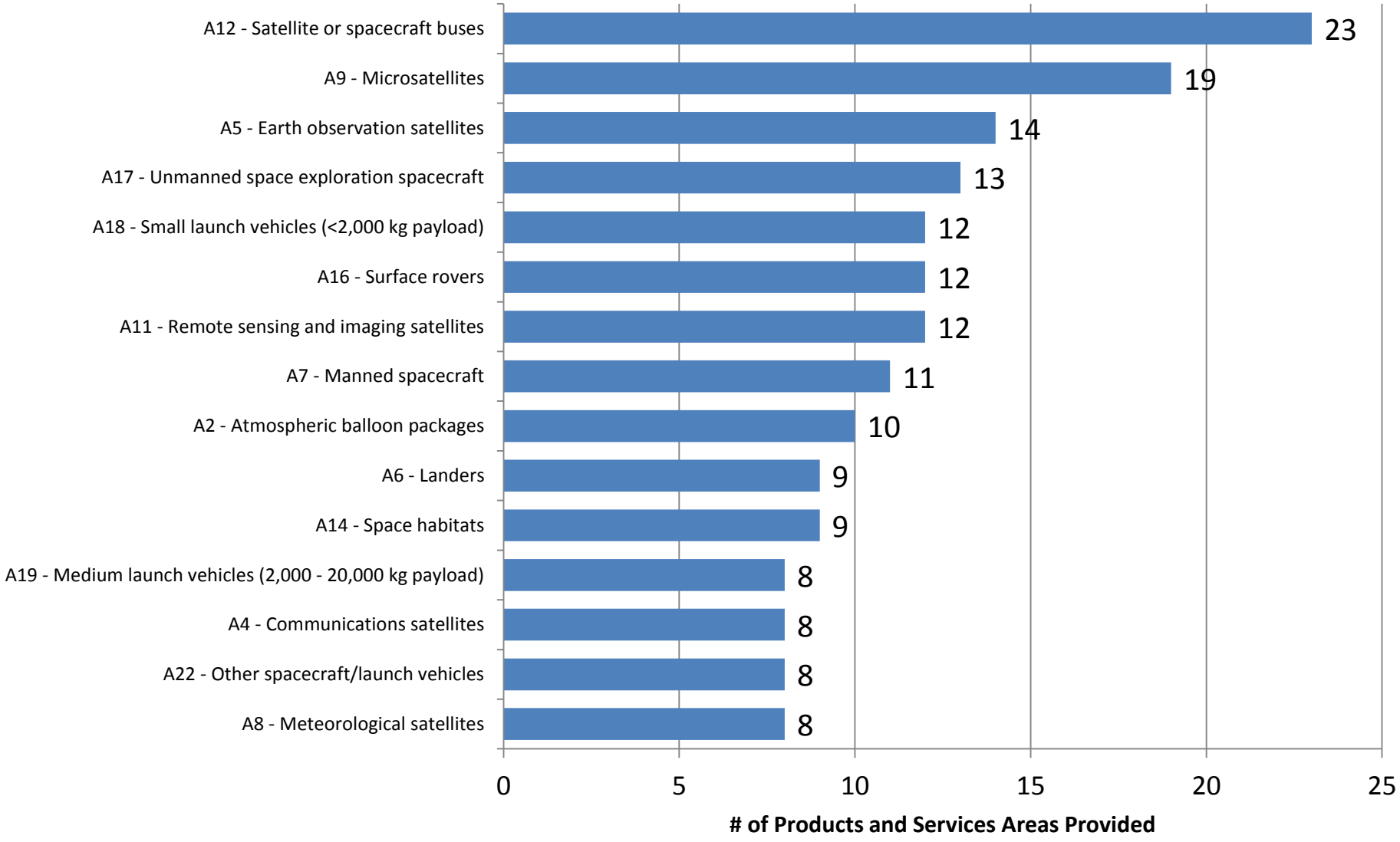
Leverage existing USG resources to give something back to survey respondents.

Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Appendix

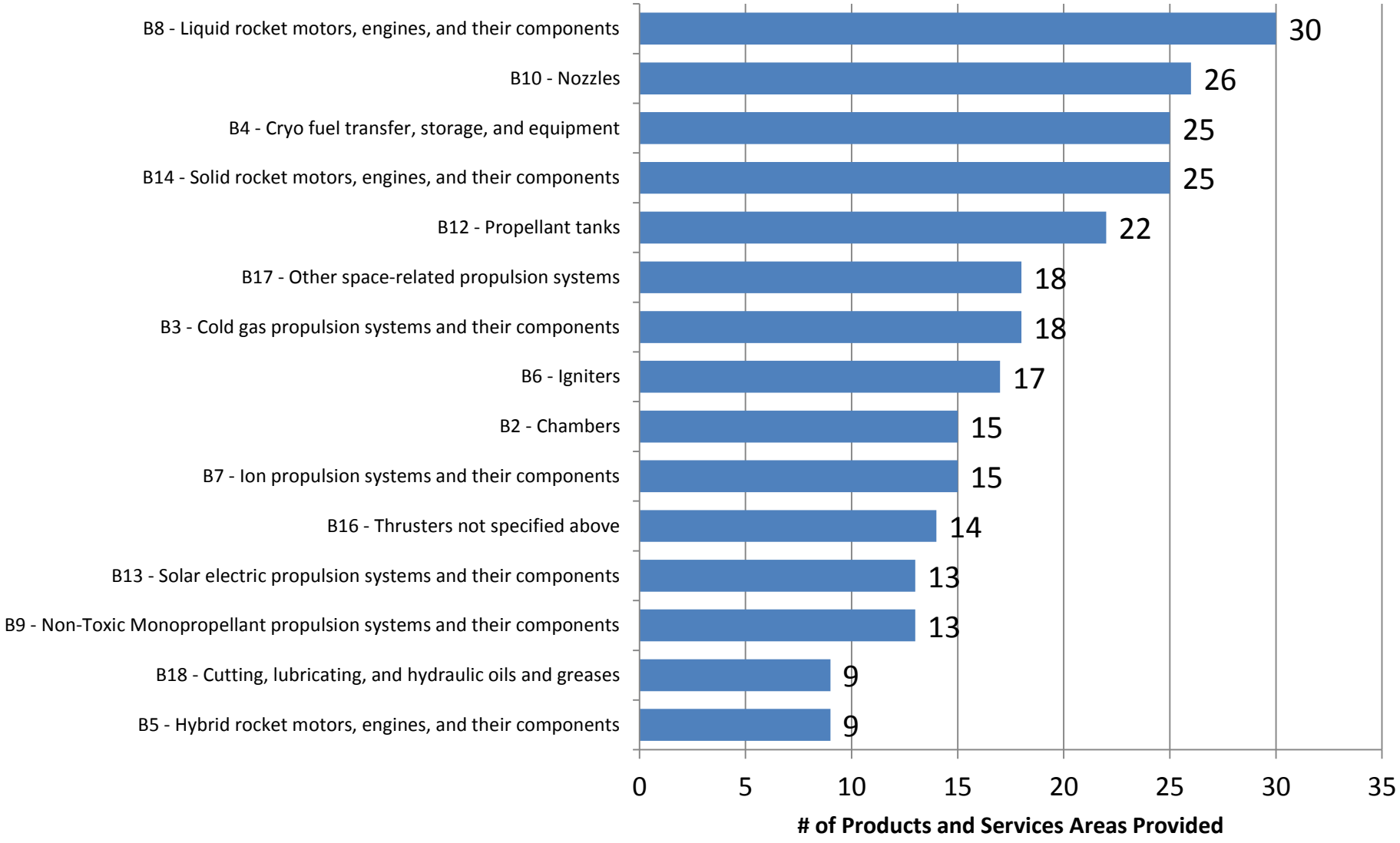
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Spacecraft & Launch Vehicles



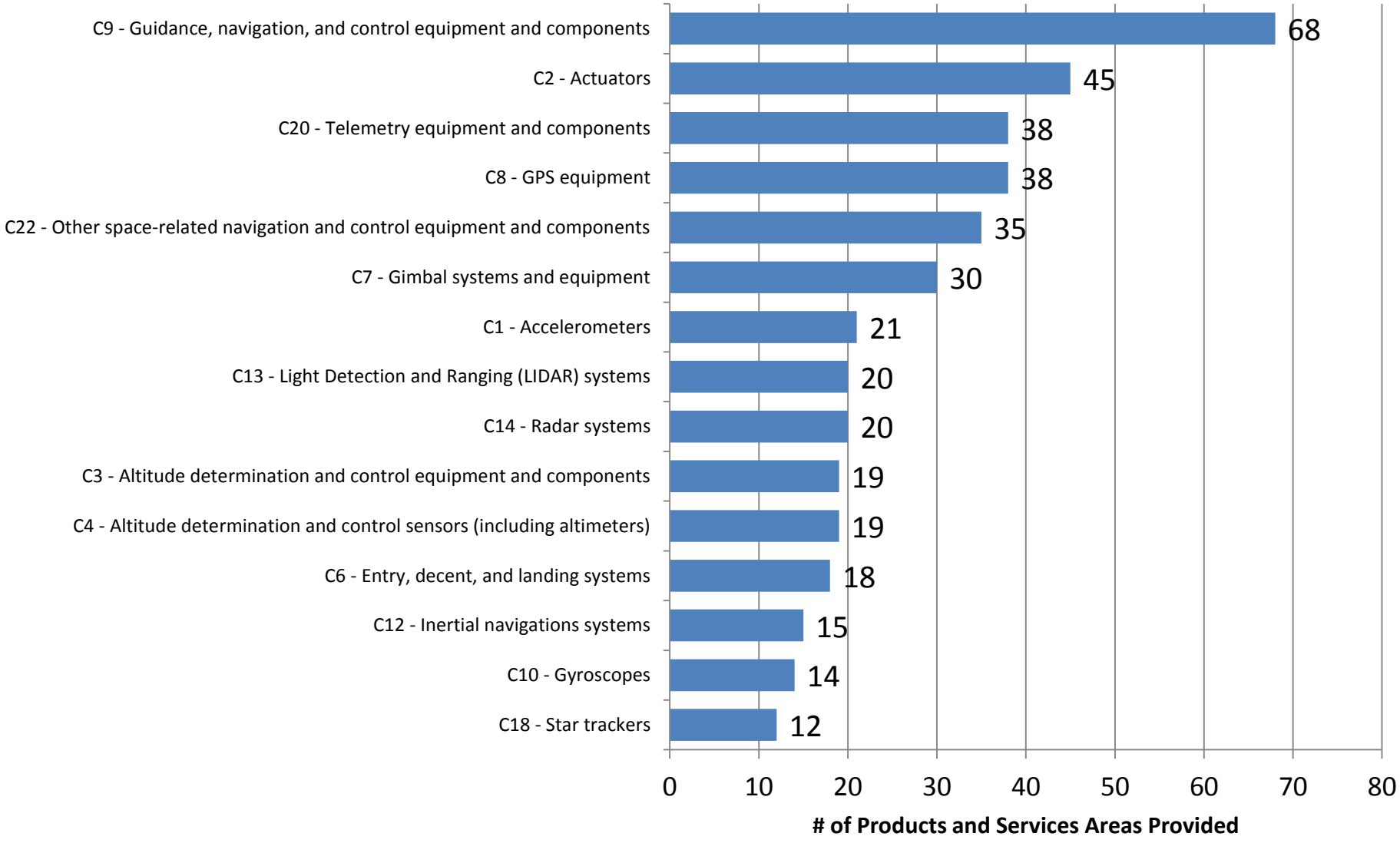
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Propulsion Systems & Fuels



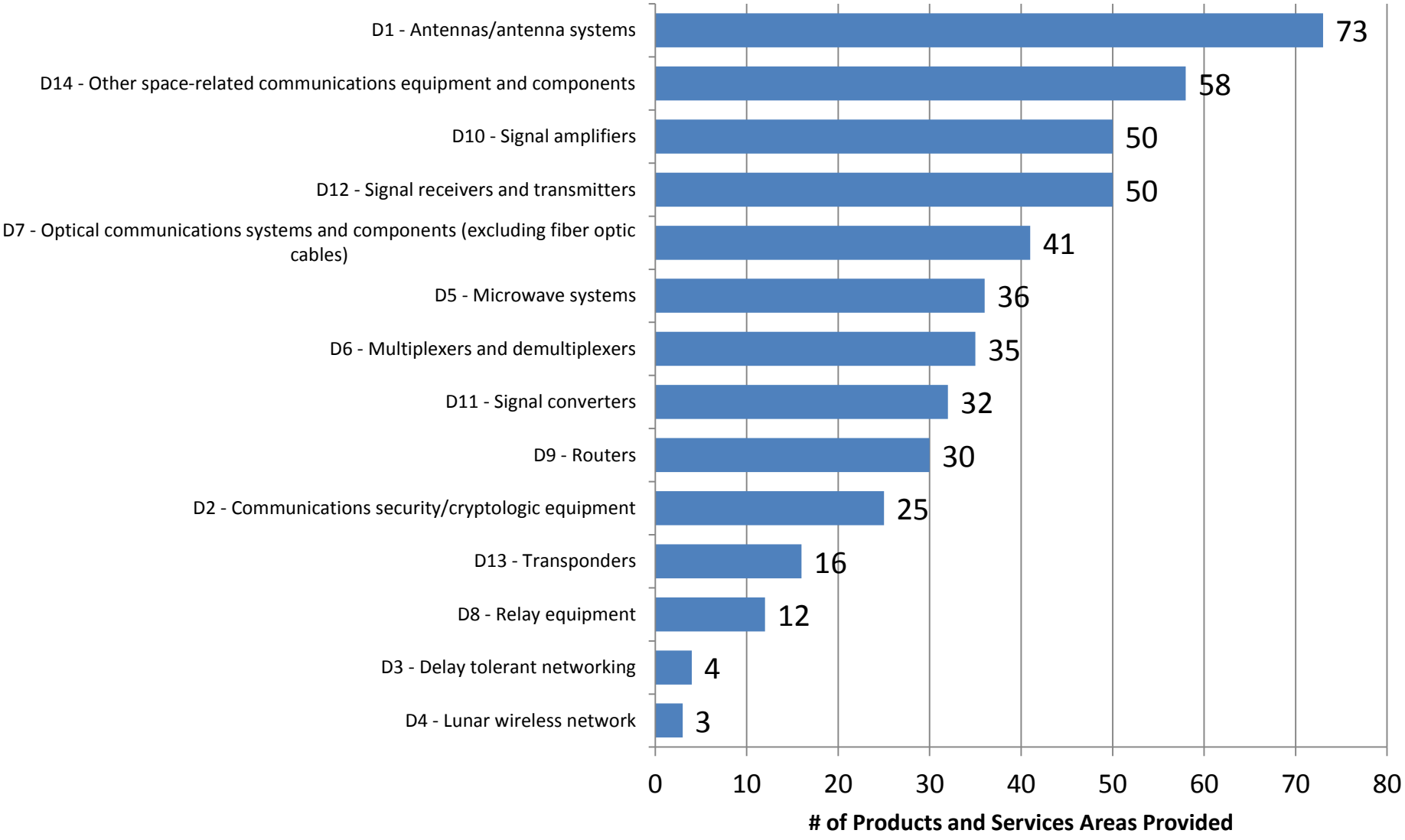
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Navigation & Control Equipment



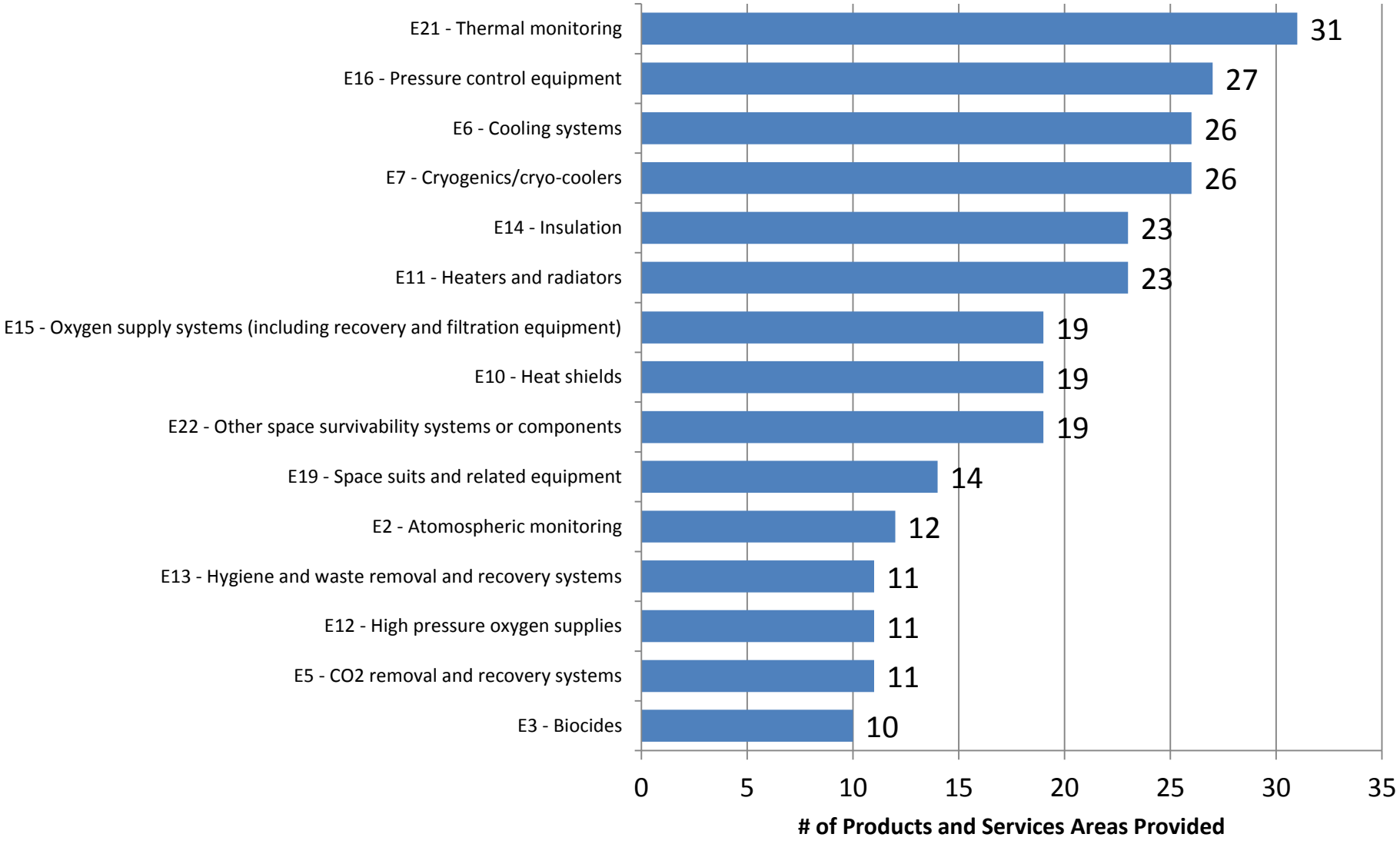
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Communications Systems



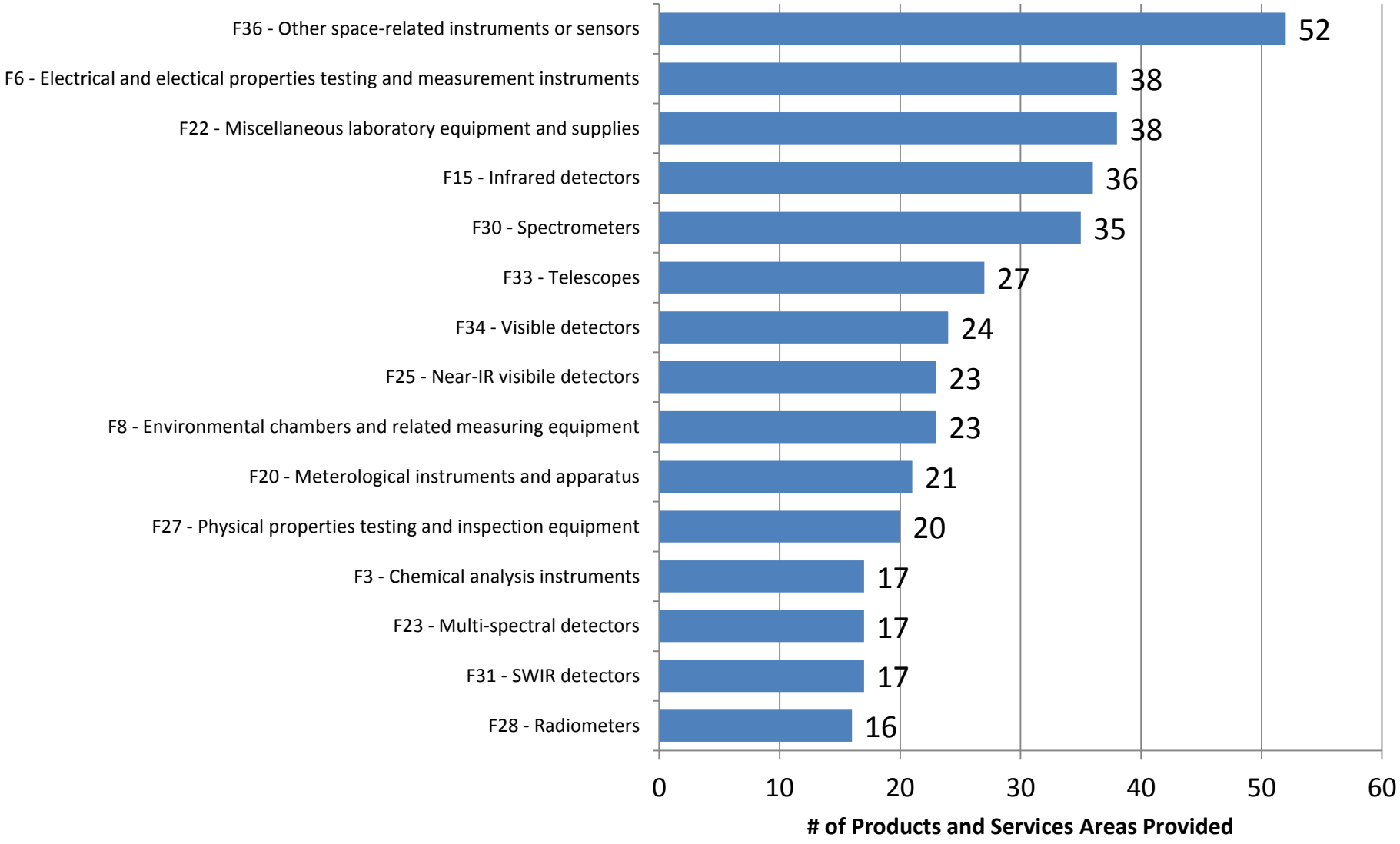
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents
– Space Survivability, Environmental Control/Monitoring, and Life Support



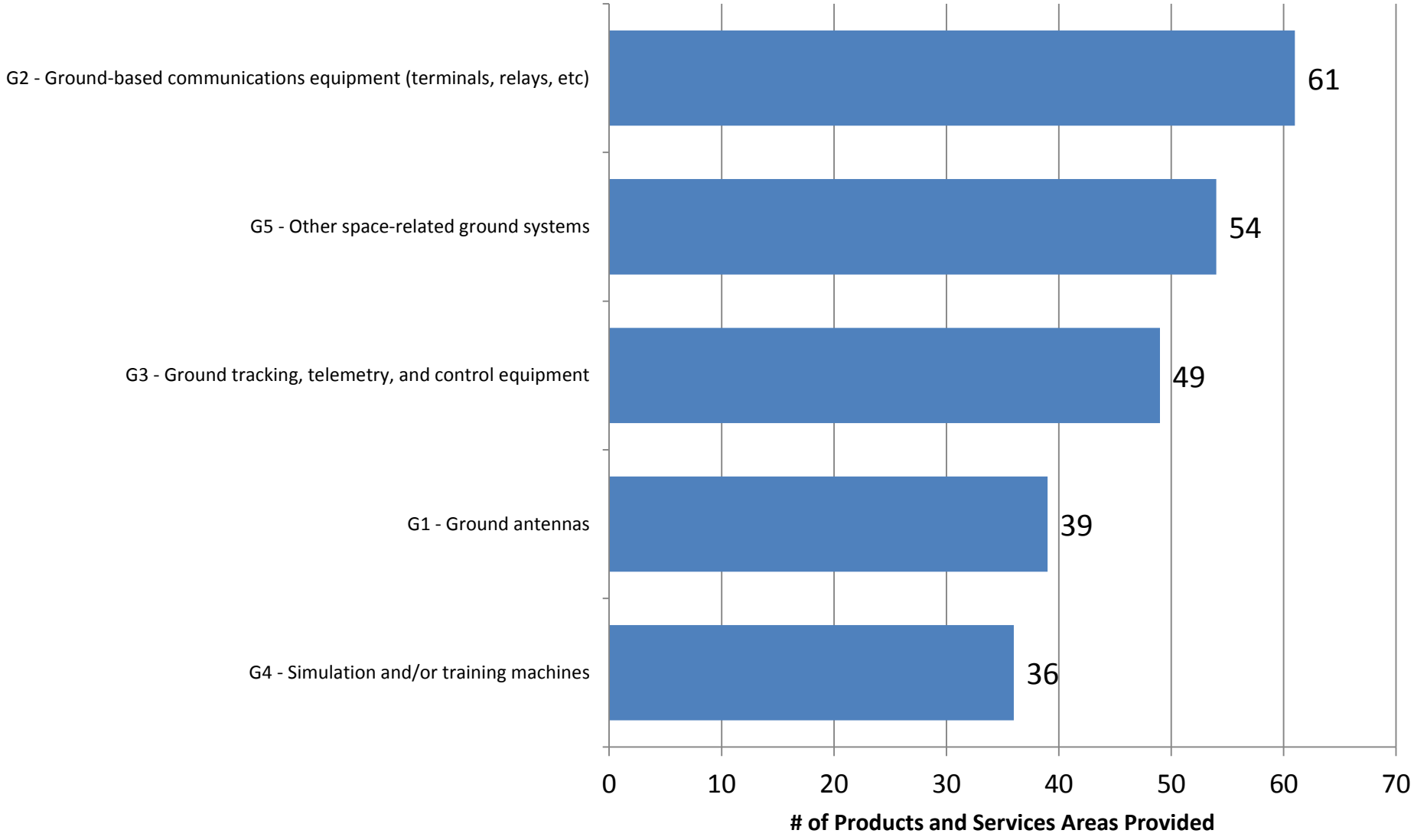
Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Payload Instruments & Measurement Tools



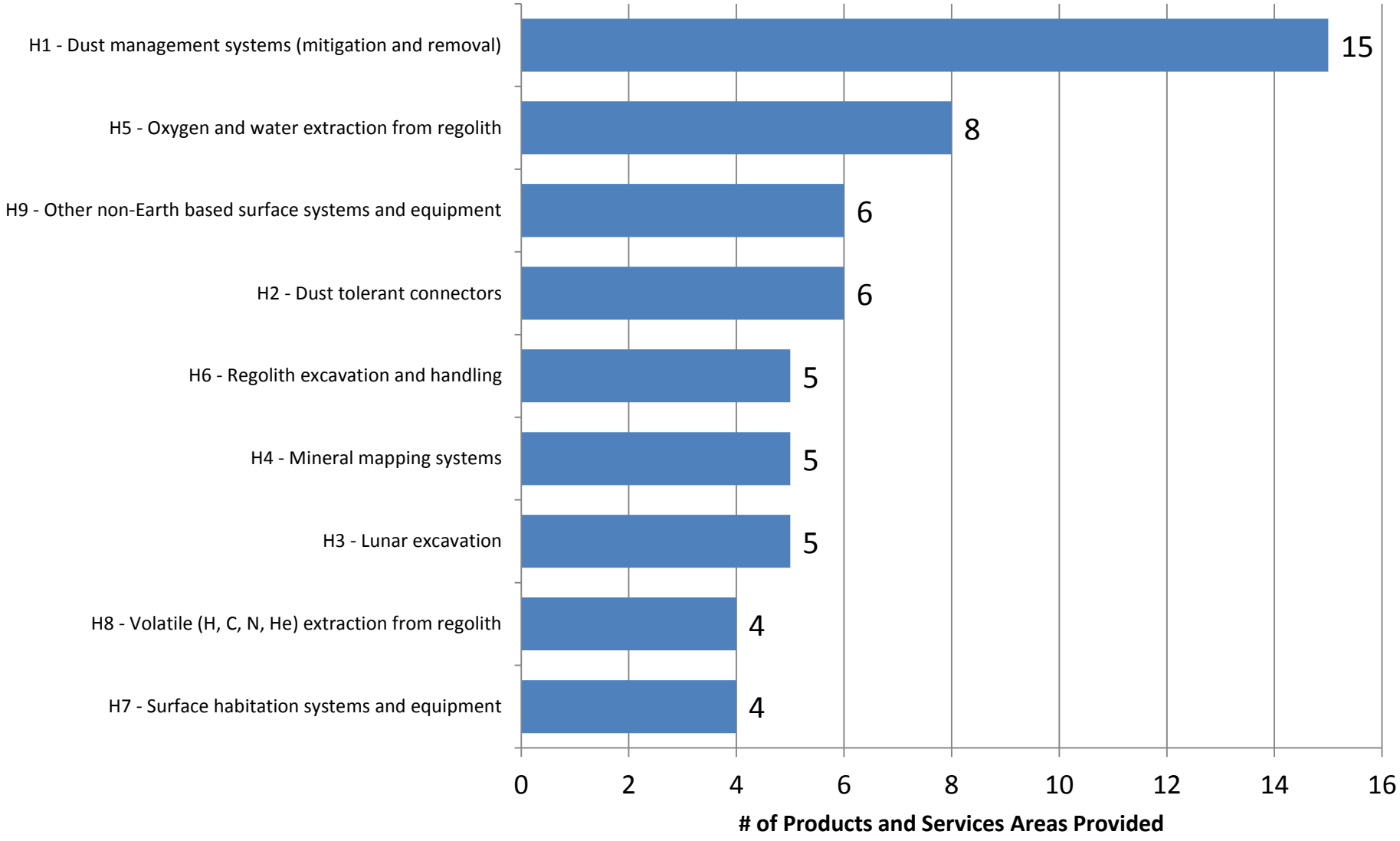
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Ground Systems



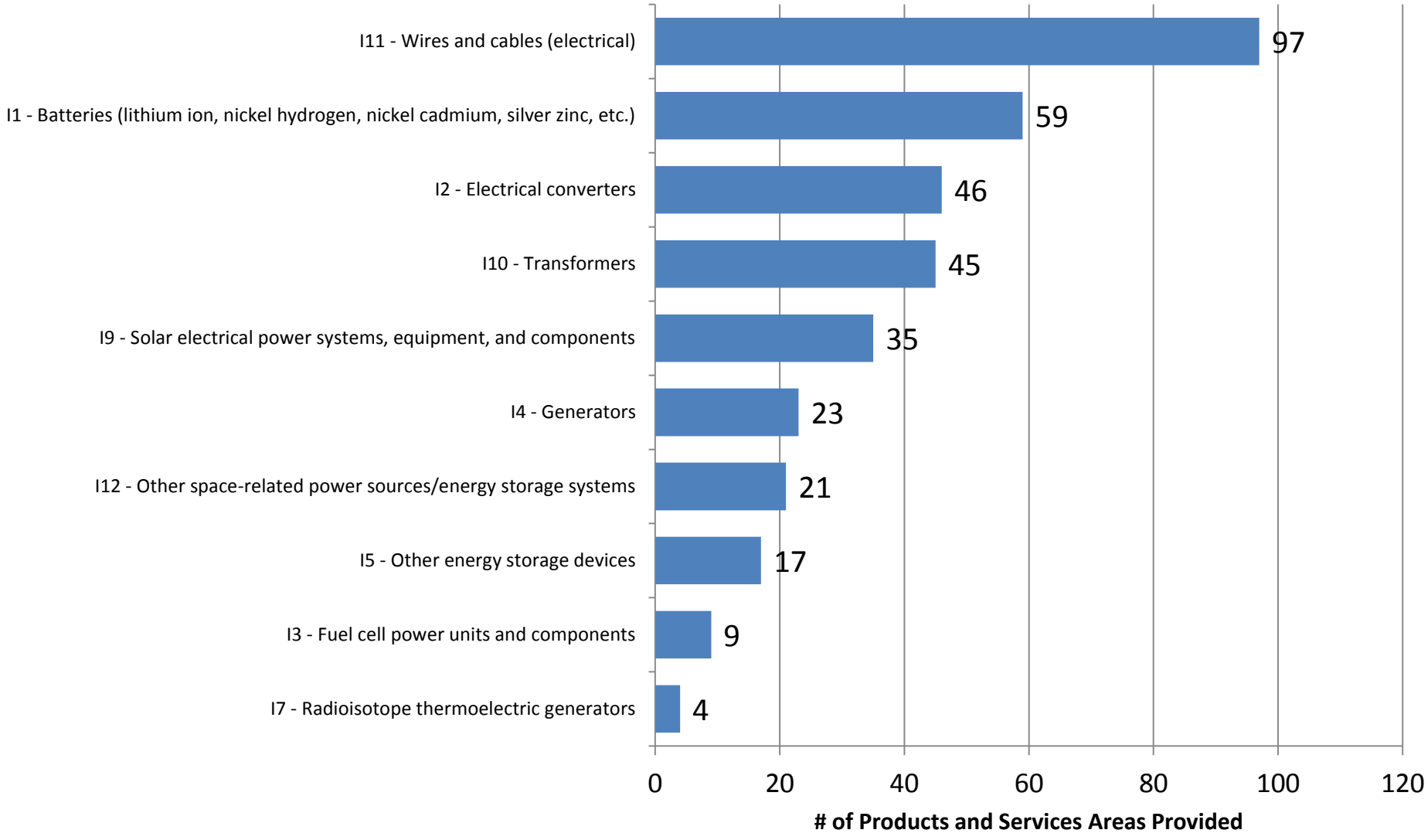
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Non-Earth Based Surface Systems



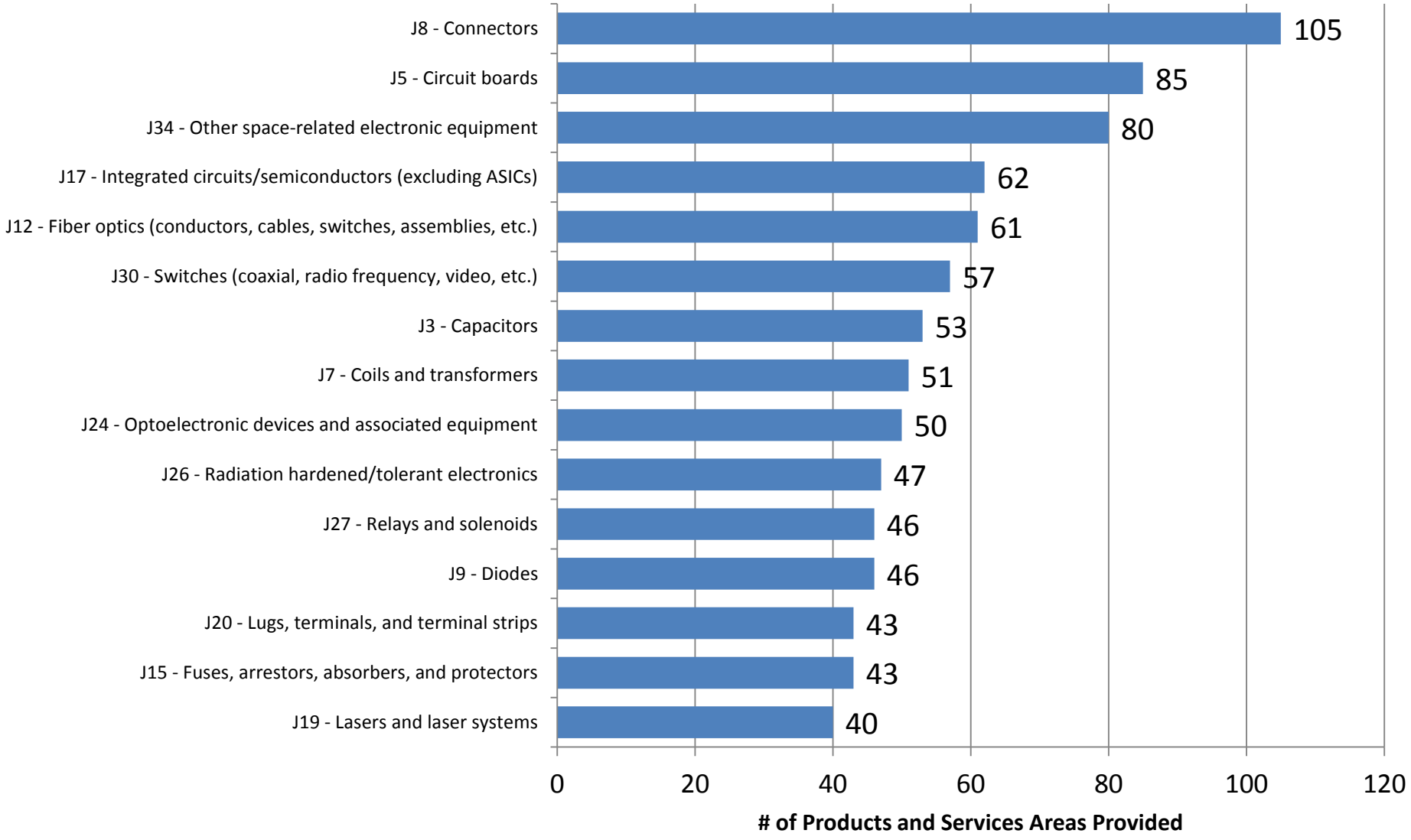
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Power Sources & Energy Storage



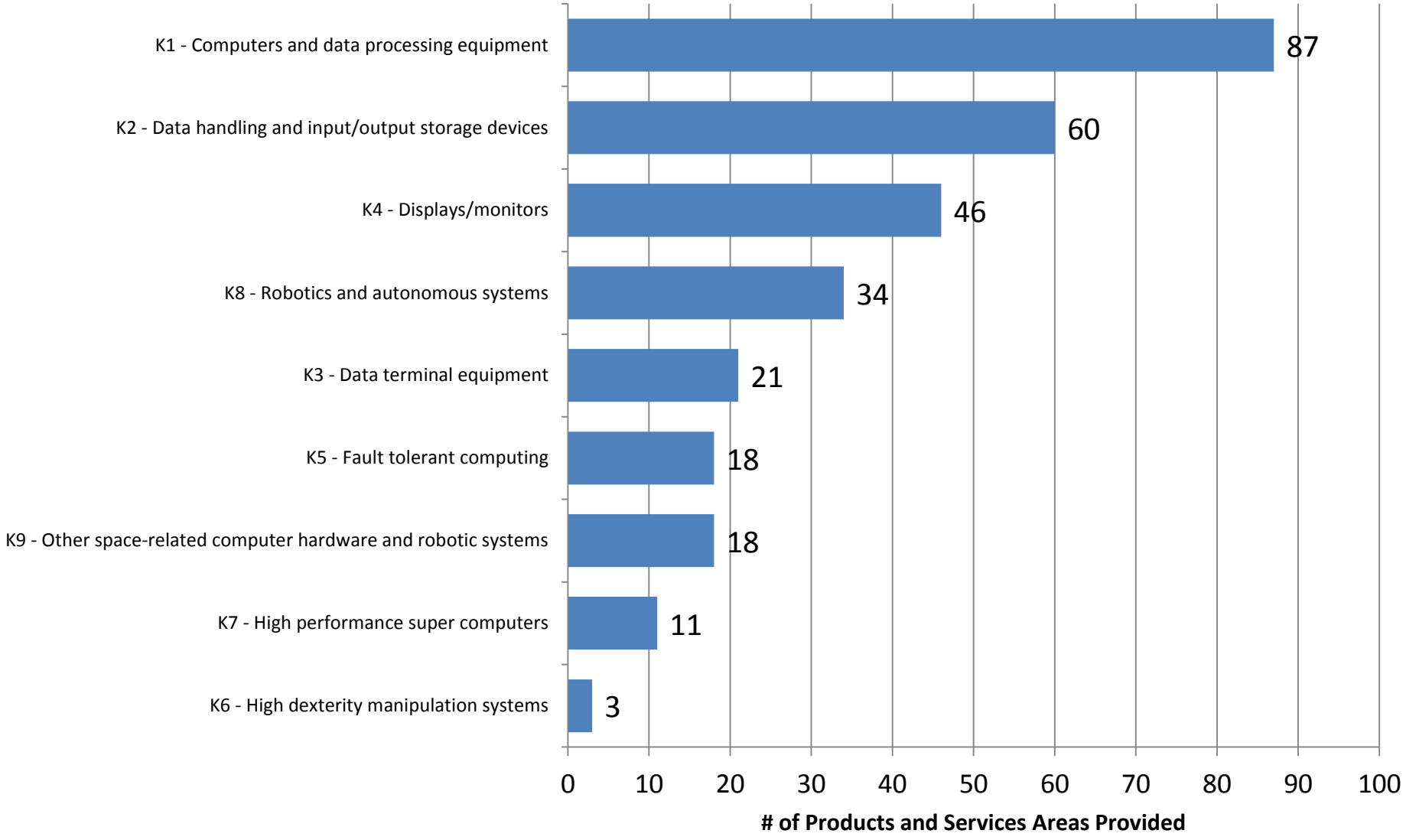
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Electronic Equipment



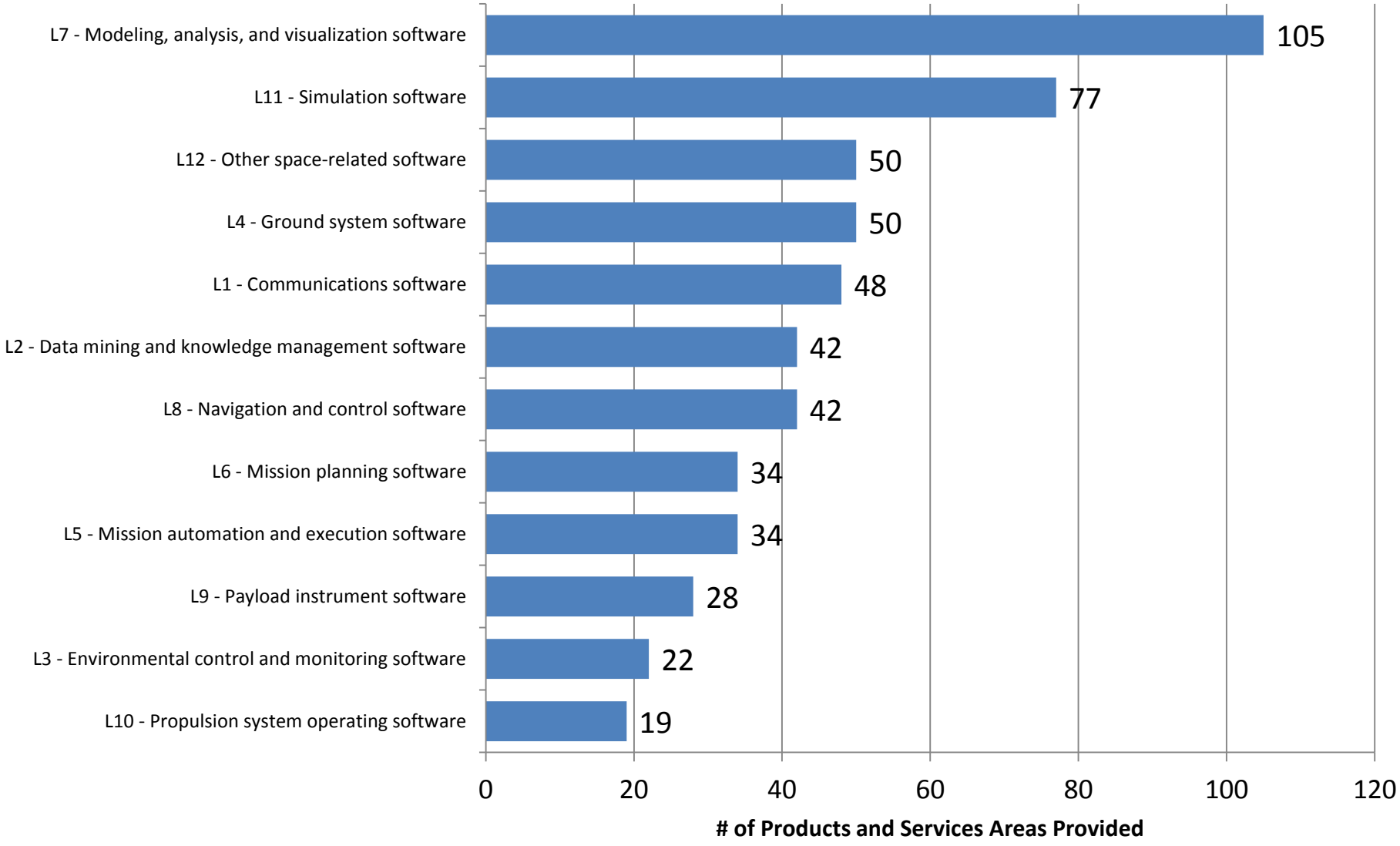
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Computer Hardware & Robotics



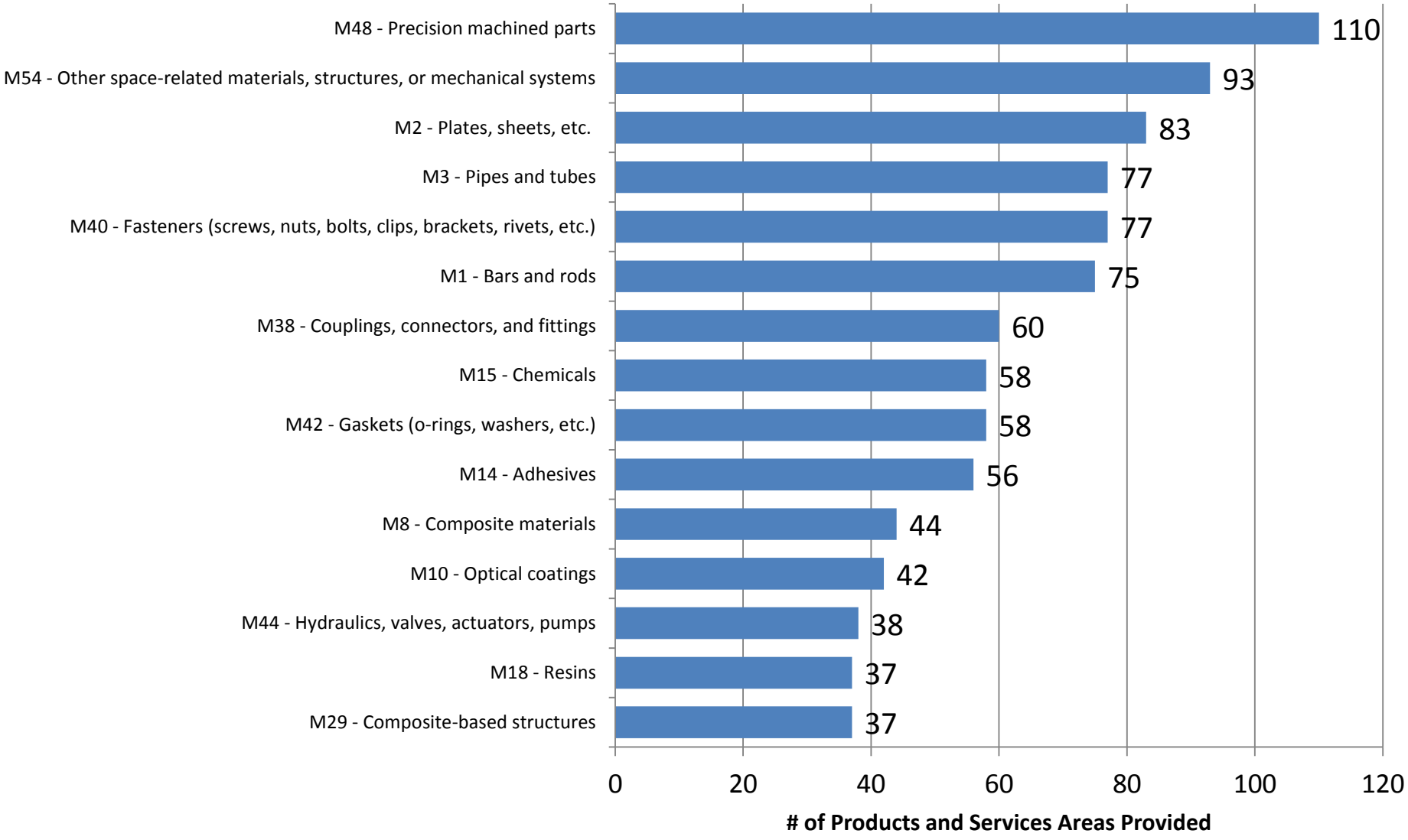
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Product Areas Provided by Respondents – Software



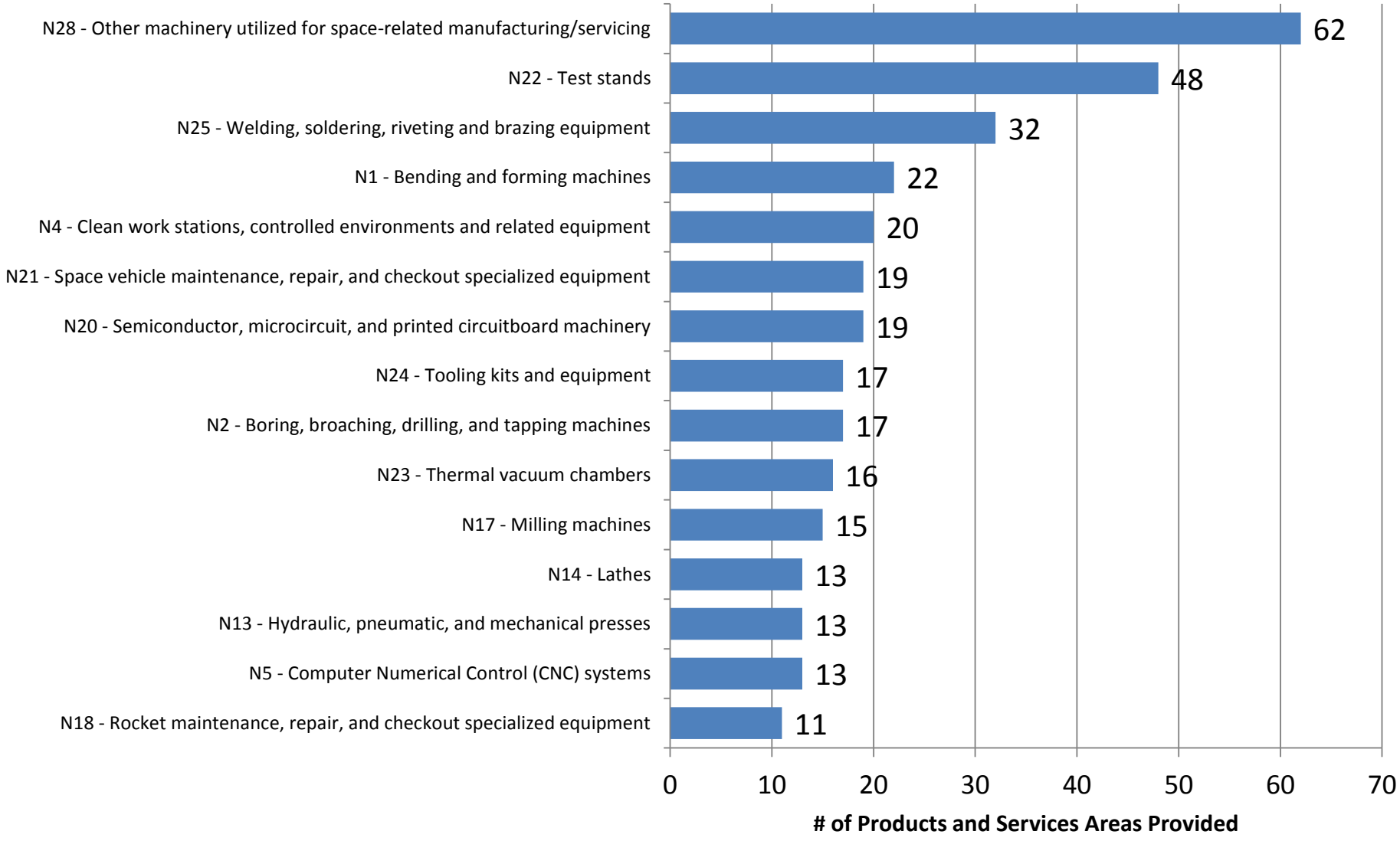
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Materials, Structures, and Mechanical Systems



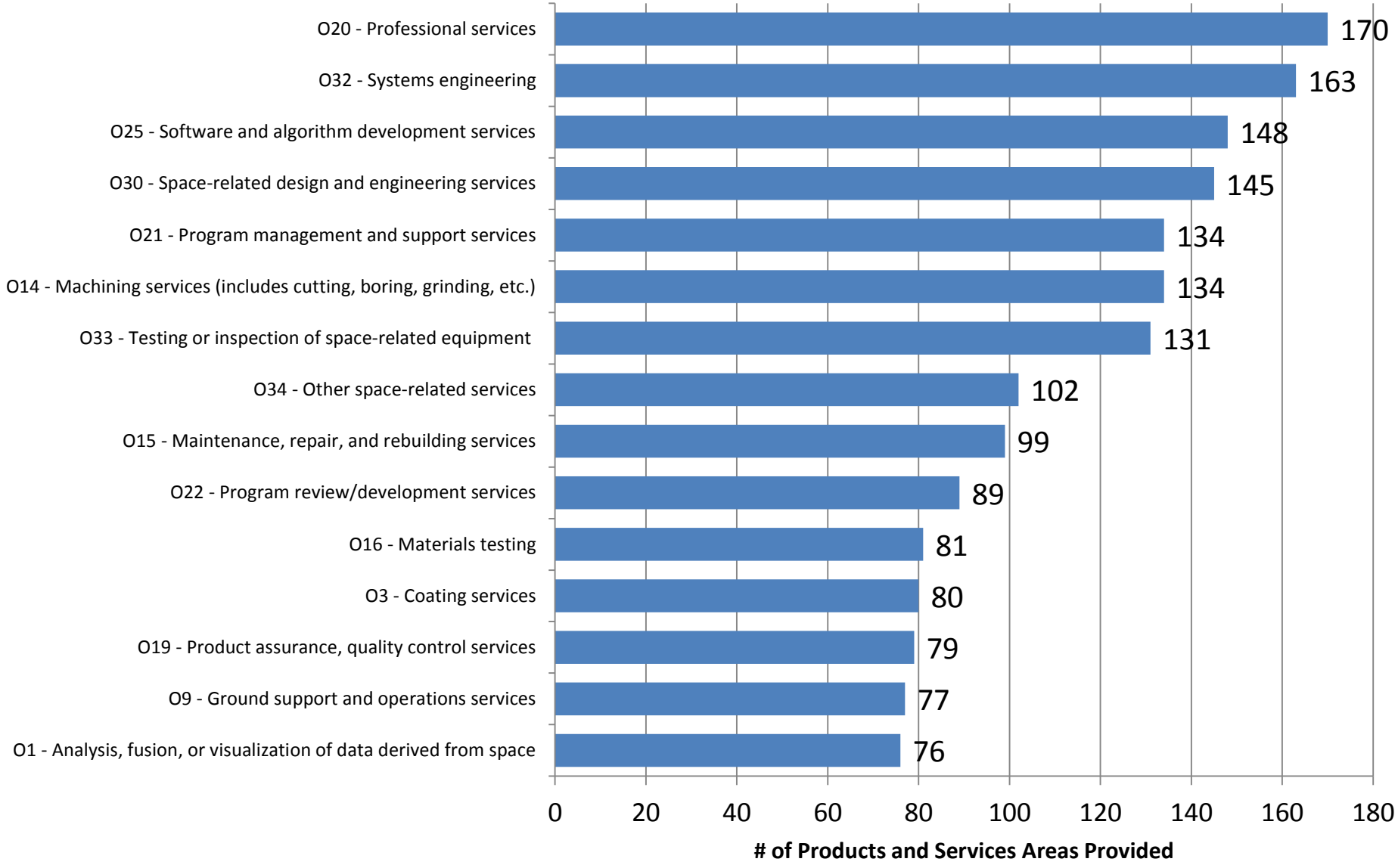
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Product Areas Provided by Respondents – Manufacturing Tools & Specialty Equipment



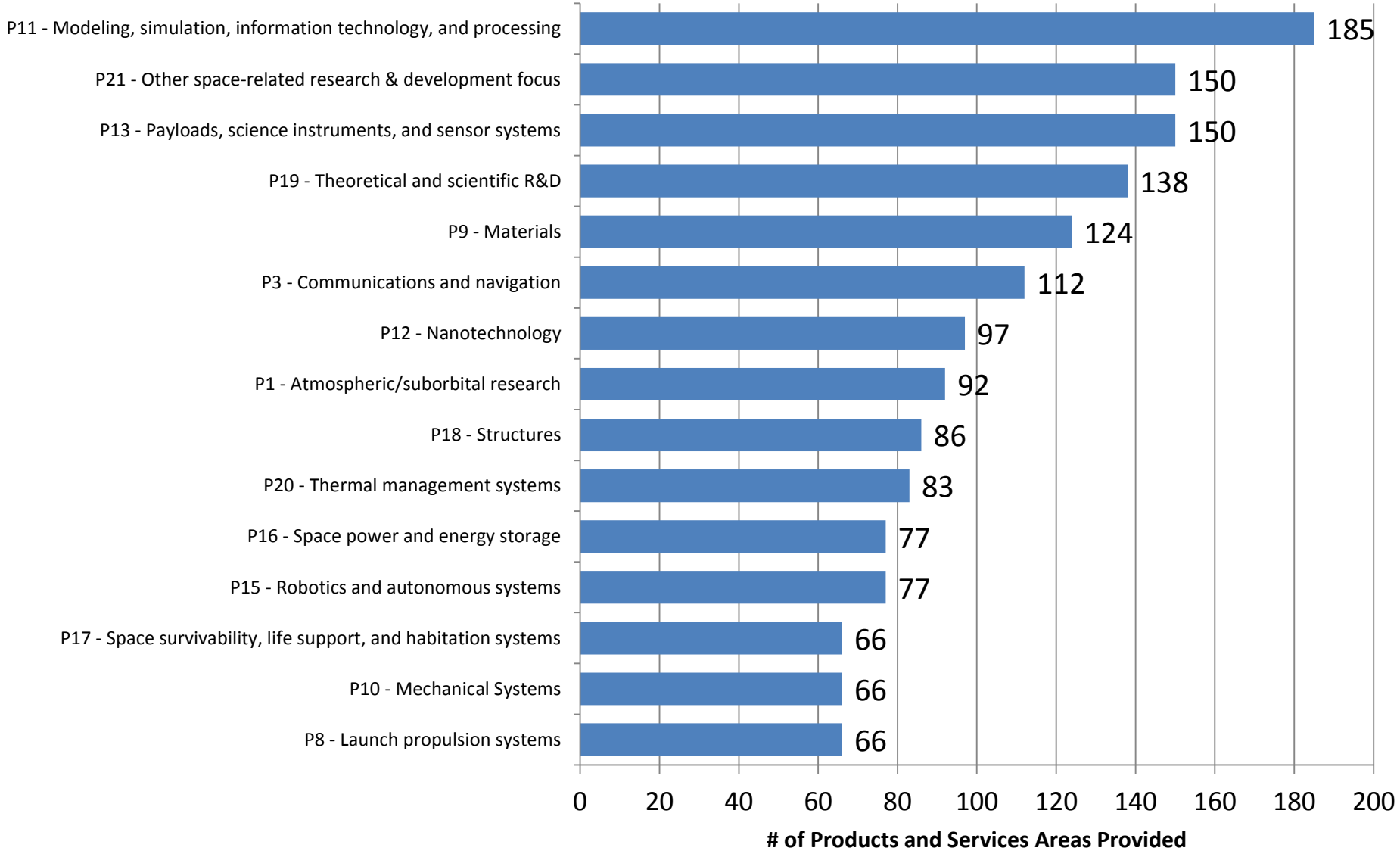
Source: U.S. Department of Commerce, Bureau of Industry and Security, *U.S. Space Industry Deep Dive*, Preliminary Data – January 2013.

Top 15 Service Areas Provided by Respondents



Source: U.S. Department of Commerce, Bureau of Industry and Security,
U.S. Space Industry Deep Dive, Preliminary Data – January 2013.

Top 15 R&D Areas Provided by Respondents



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